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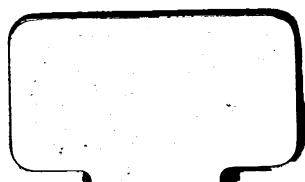
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SCRIPTURE METEOROLOGY

AND

MODERN SCIENCE

BY

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GLASGOW:

GEORGE GALLIE, 99 BUCHANAN STREET.

EDINBURGH: ANDREW ELLIOTT.

LONDON: JAMES NISBET & CO.

1867.

196. g. 12.

GLASGOW :
DUNN AND WRIGHT, PRINTERS.

PREFACE.

THOSE regarded as most competent to judge, agree in saying that the subject of Meteorology is as yet imperfectly understood. What, however, seems to us most to be regretted is the fact, that while in several leading matters the Bible teaches one thing, Science teaches quite another. Hence, both scripture and science are unhappily placed in a position of mutual antagonism.

After a careful study and comparison of what the scriptures make known, and what is generally taught in scientific treatises, it has ceased to be with us a question whether the information furnished by the book of God, or the conjectures and theories of men, are most worthy of confidence.

The book of nature, like the book of inspiration, is its own interpreter ; and whosoever wishes truly to

understand either, will carefully study it, in preference to all human systems, whether theological or philosophical.

The atmosphere, with its enduring yet ever-varying phenomena, is with reason accounted a highly interesting study. In this province of God's universal kingdom, the footprints of him who made and rules it are most clearly seen and most easily traced. Great importance is accordingly attached to a true and intelligible view of the constitution and the changes of the region of the atmosphere.

This, however, has been called a sceptical age. It has a creed and system of its own: it is pleased to believe "in all but the infinite capabilities of the human intellect," and tenaciously to hold "the inviolability of nature," in opposition to the doctrine of a personal, omnipotent, and living God, the creator and preserver of the world. Indeed, the denial of God and supernatural agency is now notoriously prevalent. A system of physical causation, very like the ancient deification of matter, is made, by a machinery of laws, the source and origin

of all being, and, of course, the supreme and dominant power of the universe.

We doubt not that, through haste and inattention, and a certain measure of natural aversion to the preternatural and the divine, the facts of science are placed by some in opposition to the statements of the Bible. As, however, to the perfect agreement of scripture and true science, this is fully admitted by men of highest attainments; "only," it has been well remarked, "the unsound speculations of scientific theorists are in antagonism to the divine record. As true science advances, the baseless fabric of man's invention falls, while the truth of the Bible stands forth in all its majesty."

The too ardent cultivators of mere physical science will, we doubt not, in due time cease to mystify the mind of mankind. True knowledge will advance. The friends of sacred truth will diligently study and faithfully declare all the mighty works of God. "The works of the Lord are great; sought out by all those who have pleasure therein." "The Lord by wisdom hath founded the earth; by understanding hath he

established the heavens : by his knowledge the depths are broken up, and the clouds drop down dew."

The object sought to be accomplished in the following pages is to assert the supremacy of Bible teaching regarding physical forces and the laws of God, and to show the entire subordination of all these to his direction and control in carrying out his wise and holy purposes in grace and providence.

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METEOROLOGY.

THE SUN.

Its Relation to Meteorology.

SOLAR action, and its manifold effects on the seasons and the weather, essentially belong to the subject of Meteorology; albeit this important fact has been, not seldom, almost entirely overlooked. The sun, though a vast and distant orb, is ever present with us by its vital emanations. Even when its light is hid, and darkness overspreads the earth, we are still sustained by its unfailing influence. In times of old, men of understanding well knew the value to the earth of the powerful benignant action of the heavenly bodies. They could, without the aid of telescopes, behold with their eyes that "there is one glory of the sun, and another glory of the moon, and another glory of the stars." And they accordingly acknowledged, as the choicest earthly good of a people or a nation, "the precious things of heaven—for the dew, and for the deep that coucheth beneath, and for the precious things brought forth by the sun, and for the precious

things put forth by the moon, and for the precious things of the earth, and the fulness thereof." What reason, then, had some astronomers to make it a question, "Whether the solar phenomena have any effect upon the weather, or the productiveness of the seasons?" Call we this philosophy?

Were the vital functions of the great light that rules the day not sufficiently recognised, Meteorology would be a lame and defective study. The sun's essential and felt effects on all the tribes of being, as also on the products of the earth and of the sea, render it an object of the highest consideration. "The sun is the almoner of the Almighty, the delegated dispenser to us of light and warmth, as well as the centre of attraction, and, as such, the immediate source of all our comforts, and, indeed, of the very possibility of our existence on earth." So essential is this luminary to our world, that were its extinction possible, "in three days, in all probability, there would not be a vestige of animal or vegetable life on the globe, unless it were among the deep-sea fishes and the subterranean inhabitants of the great limestone caves."—*Sir John Herschel.*

Its Magnitude, Rotation, and Spots.

For the knowledge of many facts in regard to this great luminary, we are altogether indebted to scientific observation. "As compared to our world," Dr Dick remarks, "the magnitude of the sun overpowers the imagination. The diameter is 880,000 miles; its circumference 2,764,600 miles. It could contain

within its circumference more than thirteen hundred thousand globes as large as the earth; it is five hundred times more capacious than all the planets, satellites, and comets taken together. Its distance from the earth is 95,000,000 miles. And while it would take a cannon ball, moving at the rate of 480 miles every hour, nineteen years and three months to reach the sun, light comes from it to us in eight minutes and a quarter."

"This luminary," he further remarks, "is found to have a rotation round its own axis. The rotatory motion of the sun was discovered by the motion of certain dark spots across its disc. The time in which the spots perform their revolutions is twenty-five days ten hours. The number of spots is various; sometimes there are only two or three, sometimes above a hundred, and sometimes none at all. The magnitude of some of the solar spots is astonishing. One seen Nov. 16, 1835, was 22,000 miles in diameter, which is nearly three times the diameter of the earth. The smallest spots we can discern cannot be much less than five or six hundred miles. No spot has been known to last longer than one that appeared in the year 1676, which continued upon the sun above seventy days; but it is seldom that any spots last longer than six weeks."

"As regards the number of spots that appear on the sun at different times, there is the greatest possible difference. Sometimes it is quite spotless; at others the spots swarm upon it, and as many as fifty or sixty spots or groups, large and small, have been

seen at once, arranged in two belts."—*Sir John Herschel.*

Its Nature.

The nature of the sun is not less wonderful than its astonishing magnitude. It was regarded by Sir Isaac Newton as a globe of fire. Others have imagined it opaque and inhabitable, and that its heat and light do not reside in its mass, but in a coating which lies on its surface. It is now however regarded, as by Newton, an incandescent body. By a calculation and estimate of the intensity of the sun's heat at its surface, "it turns out to be more than 90,000 times greater than the intensity of sunshine on our globe at noon and under the equator—a far greater heat than can be produced in the focus of any burning-glass, though some have been made powerful enough to melt not only silver and gold but even platina, and indeed all metals which resist the greatest heats that can be raised in furnaces."—*Sir John Herschel.* And here we may remark, in passing, how widely different the calculations and conclusions of philosophers have sometimes been, and how slow and feeble frequently their greatest efforts to grasp and duly estimate the works of God.

With respect to the sun's spots, Dr Dick adopted the conclusion "that in those years when they are numerous the seasons are colder—more unproductive of vegetation. This was remarkably the case in the year 1826, when the solar spots were extremely numerous, and when the harvest was so late and

scanty that the price of all kinds of grain was more than double what it had been before, or what it has been since. The years 1836 and 1837 afforded similar examples ; for during an interval of eighteen months the solar spots were more numerous than in any other period in my recollection, and the cold of the summer and harvest, and of the winter and spring of 1837, and its unfavourable effects on vegetation, were greater than what had been experienced for more than twenty years before.”—*Celestial Scenery*, p. 315.

Its Connection with the Aurora.

Other remarkable facts in relation to the sun's spots have been ascertained, to which, as well as to that pointed out by Dr Dick, we shall afterwards have occasion to refer. “The aurora, or northern lights,” remarks Sir John Herschel, “have been much more frequent in the years when the spots were abundant, and extremely rare in those years when the sun is free from spots. And magnetic storms invariably accompany great displays of the aurora, and are much more frequent when the sun is most spotted, and are rarely or never witnessed in the years of few spots. The auroras are accompanied with great electro-magnetic disturbances in every part of the world.”

The Earth's Dependence on the Sun.

On all sides it is acknowledged that the sustaining power of the world is the sun.

Great source of day ; best image here below
Of thy Creator ! ever pouring wide
From world to world, the vital ocean round.

The earth and all its living tribes are as dependent on the sun as the muscular and nervous organs of the body on the living mind. Should the vital emanations of the heavens be excluded from the lifeless masses of the earth, there would be no formation and no growth, and the world without vegetable products, or animal and motive power, or any change, would be uninhabitable. And while this great light of heaven sustains all creatures by its life-giving efficacy, it at the same time adorns them with all the tints and hues of loveliness and beauty. In creating the sun to enlighten, and sustain, and decorate the world, has not God prepared an instructive emblem of His own supremacy and goodness ? "The Lord God is a sun and shield ; the Lord will give grace and glory ; no good will he withhold from them that walk uprightly." We cannot, then, but admire the wisdom which placed this glorious and vivifying orb in the centre of the planetary system. Hence the reason is apparent "why the largest mass of gravitating matter should diffuse inexhaustible supplies of light and heat in all directions, while the other masses are merely passive with respect to such influences." And have we not reason to conclude that all the riches and the power of the ruler of the day are contained in itself, and not at all supplied by fragmentary arrivals from other bodies ?

It gives a light to every age;
It gives, but borrows none.

The sun needs not, like other orbs, to be sustained and acted on by a greater than itself. On what other orb can we suppose it to be dependent? Without receiving anything of which we can have any knowledge or conception, it is ever pouring forth from its own exhaustless treasures, those rich and vital influences which animate and sustain all living things.

It is evident that our opaque and dependent earth, being of necessity a needy pensioner on the sun's bounty, cannot be put in the same category with that independent all-sustaining luminary. And seeing how they stand related as giver and receiver, is it not preposterous to speak of God's government of the world as consisting chiefly or altogether in terrestrial and atmospheric sequences?

The atmosphere, as well as the earth and its productions, is indebted to the sun for its value to the world. Why, then, should the laws and phenomena of this stipendiary world be vaunted, while the great primary source of light and life is overlooked? The reasoning which applies to our globe cannot all be applied to the sun. None can comprehend how that vast and splendid orb is itself sustained, or how it is rendered capable of sustaining the entire planetary system by which it is surrounded. Who can conceive whence proceed all its sources of life, energy, and beauty? What are the principles that regulate its operations from its centre to its circumference? and whence the admirable formation of the sun's beams

which, with such amazing speed, are transmitted to our world? What provision has been made for its enormous expenditure of elements so admirably suited to our earth, and as superior to earthly forces as the living mind to the earthly body, so as exactly to suit both the physical requirements of our globe and all the higher ends of moral government?

Its Light Necessary to Animals and Plants.

"Light is known to be as necessary to the health of plants and animals, as air. They have in their constitutions certain periodical functions which have a reference to the alternations of heat and cold, and certain other periodical functions which have a reference to the alternations of light and darkness. The length of the period of such functions appears to coincide with the natural day; it requires a year to circulate the sap in plants. The diurnal revolution is equally necessary for plants and animals. Longer or shorter days and nights, or longer and shorter years, or the sun more near or more distant, would not suit the constitution of the vegetable kingdom. Our earth and its productions and inhabitants not merely depend on the sun, but require the solar system to be constituted as it now is. How entirely then does the existence of the world depend on the great created source of life and influence."—*Whewell*.

And how does this arrangement affect the animal creation and regulate its movements? "The stork in the heavens knoweth his appointed time, and the turtle and the crane and the swallow observe the

time of their coming." And again, as to the vicissitudes of light and darkness, "Thou makest darkness, and it is night, wherein all the beasts of the forest do creep forth. The young lions roar after their prey, and seek their meat from God. The sun riseth. They gather themselves together, and lay them down in their dens. Man goeth forth unto his work, and unto his labour until evening. O God, how manifold are thy works; in wisdom hast thou made them all."

As to the herbage of the world, look at a single plant. Internally it is pervaded by the solar element and electricity; externally it is adorned with the richest colours, which are, so to speak, painted on it by the sun. And thus all the products of the earth, and all its living tribes, enjoy the vivifying influences of the mighty orb that rules the day. And hence it is most manifest that this world was not so made that of itself and by its own proper energies it should answer all the purposes of Providence; for it has been constituted a dependent on the sun, without whose vital agency it could not subsist for an hour, as the seat of either animal or vegetable life. For, were solar influence withheld, death, with its darkness and torpidity, would quickly make an end of everything that lives. How differently, then, are the earth and the sun constituted!

And on what could the great luminary, whose rich emanations are the life of many orbs, be itself dependent? Whence could its exuberant vitality and power be derived, or by whom supplied? What God

himself is to the moral world, He has made the sun to the world of sentient inhabitants. Wherefore, in sustaining and governing the earth, the aggregate of all its native energies, together with the entire system of its physical laws, is not to be compared to the paramount and vital action of the heavens.

Its Power in Tropical Regions.

In the warm and fertile regions of the earth is most readily perceived how mightily the vital powers of the heavens act upon our lower world. How luxuriant the vegetation, how large and tall the trees, how rich and various the fruit! With what beauty and magnificence is the earth arrayed! Living tribes of beings, as well as plants and flowers, of which the number is incalculable, are all adorned with incomparable splendour. The very shells on the sea-shore, and the fish in the waters, display a vividness and beauty unknown in colder regions. And of all this abundance and variety of life and beauty the great creative source is the sun. "As this influence begins to decline, all nature fades and withers, till winter comes, and vegetable life seems extinguished. So in the course of time the winter is past, the rain is over and gone, and the face of nature is reversed. First spring, then summer, and then autumn, with their buds and blossoms and fruits. The whole life and beauty and produce of the earth is owing to the sun, and therefore he possesses a vivifying and fructifying influence."—*Sturrock.*

Dependent on a Greater than Itself.

Now this great ruling light of heaven, notwithstanding its supremacy in the planetary system, and the dependence of our world upon it, being in itself a thing without life, must be both sustained and ruled by a greater than itself. Matter cannot organise and animate itself, or direct its own course; yet the state and functions of the sun are continually changing in more ways than one. This, on the supposition of its being governed by uniform, insensate law, is inconceivable, nay, impossible; but easily accounted for, if we refer its states and alternations to the care and wisdom of the Ruler of the world. Its spots, which are many, and often larger far than the earth we inhabit, manifest great and frequent changes in its body; which irrefragably prove that its influence upon the globe is not measured and controlled by blind unchanging laws, but by the hand and fiat of the Omnipotent Creator, who at first adjusted all the forces of the physical creation to one another, and still directs their operation in a suitableness to the ends both of life and moral government.

The Influence of the Stars.

In the inspired record of creation we read that "God made two great lights; the greater light to rule the day, and the lesser light to rule the night: he made the stars also. And God set them in the firmament of heaven to give light upon the earth, and to rule over the day and over the night, and to divide the light from the darkness: and God saw

that it was good." The combined influence of both the sun and the stars was adapted to the condition of the world. In the eastern sky this is very manifest. There, especially, the stars are seen as if suspended like bright and shining lamps from the arch of heaven. The united action of the starry heavens is powerful and genial beyond our apprehension. "Canst thou bind the sweet influences of Pleiades, or loose the bands of Orion? Canst thou bring forth Mazzaroth in his season? or canst thou guide Arcturus with his sons? Knowest thou the ordinances of heaven? canst thou set the dominion thereof in the earth?"—Job xxxviii. Of the stars, Dr Lardner says:—"It is a startling fact, that if the earth were dependent alone upon the sun for heat, it would not get enough to keep existence in animal and vegetable life upon its surface. The stars furnish heat enough in course of the year to melt a crust of ice seventy-five feet thick—almost as much as is supplied by the sun. This may appear strange when we consider how immeasurably small must be the amount of heat received from any one of these distant bodies. But the surprise vanishes when we remember that the whole firmament is so thickly sown with stars, that in some places thousands are crowded together within a space no greater than that occupied by the full moon."

Composition of the Solar Rays.

Though sometimes obliged to demur to the reasoning of scientific men, we hail with pleasure the

true discoveries of science. Perhaps no discovery is more admirable, or of greater value, than that of the composition of the solar rays, and their varied adaptation to the climates of the world. In the sunbeam are united three agents, light, heat, and actinism, as the chemical power is called. "These three powers exist in a state of antagonism, and one is sometimes in a state of activity compared with another. The chemical principle, actinism, in the germination of plants, acts powerfully in spring, and decreases in summer, when light, the principle by which the growth of the plant is promoted, is most powerful. In autumn, the influence of both actinism and light diminish, and heat, which is required to nurture the seed, becomes increasingly powerful. In the pure white light there is a trinity of colours—blue, yellow, red; each possesses a distinct property. The blue is the chemical or actinic ray, the yellow is the luminous, and the red the calorific ray. Were the influence of one property of this trinity excluded, there would be no fruit."

"It has been observed to me by a learned friend," says Paley, "as having often struck his mind, that if light had been made by a common artist, it would have been of one uniform colour; whereas, by its present composition, we have that variety of colours which is of such infinite use to us for the distinguishing of objects, which adds so much to the beauty of the earth, and augments the stock of our innocent pleasures." Now if the variety of colours surpasses all the skill of common artists, without any doubt,

the continuously varying changes and relations of the same colours, in a perfect adaptation to the climates and productions of our globe, inconceivably exceeds all artistic skill, and still more assuredly all the power of fixed insensate law. The sun, an incandescent body, at an immense distance from the earth, has no natural connection and no sympathy with it; and the earth, for whose benefit the solar diversity is essential, can have no influence in effecting it. You hence necessarily trace this ever-varying mutation of solar rays to the same plastic and unerring Hand that at first created all things and pronounced them "good."

So beautifully has creative Wisdom contrived "the constitution of the solar beams, that their antagonistic powers are balanced one against another in exact accordance with the requirements of organic nature. It has been discovered that the proportions of these principles *are different in various parts of the globe*; light and heat being at a maximum at the equator, and diminishing towards the poles, whereas actinism is at its minimum at the equator, and arrives at its maximum in the temperate zones. This fact explains the cause obviously of the gigantic vegetation of the tropics, and the gradual dwarfing of plants as we proceed towards the pole."—*Elements of Experimental and Natural Philosophy. By Jabez Hogg.*

This remarkable discovery is most accordant with the word of God. How wonderful and how inexplicable that these three properties of the solar rays should so vary in the seasons of spring, summer,

autumn, and in exact agreement with the diversified requirements of the climates and productions of the world, as if the earth ruled the sun, and not the sun the earth. But all things are of God, who "hath made everything beautiful in his time." Notwithstanding the rotatory motion of the sun round its own axis, which is accomplished more than fourteen times a year, and the rapidity of this motion, being at the rate of 4532 miles every hour, it comes to pass that whatever section of its disc is nearest the earth, the rays emitted by it are suited to the climates and the products of each country, from the equator to the poles. This microscopic versatility of adaptation by so immense a luminary, at so great a distance, and subject to such extraordinary revolutions within itself, is not to be accounted for by any law or power of nature, or any established physical arrangement of which any just conception can be formed; and it must therefore be referred to the continued operation of the Author of the universe, who alone "blesses the springing of the earth," and enriches all lands with the blessings of His goodness.

The *quantity* of the sun's beams which reach our world ought to be considered in connection with the changes which they undergo. "Take all the planets together, great and small," says Sir John Herschel, "the light and heat they receive is only one 227-millionth part of the whole quantity thrown out by the sun. All the rest escapes into free space, and is lost among the stars, or does there some other work that we know nothing about. Of the small fraction

thus utilised in our system, the earth takes for its share only one-tenth part, or less than 2000-millionth part of the whole supply."

How wonderful indeed that this very small portion of the sun's beams, issuing from whatever part of it may be next the earth, should undergo such admirable, needful changes as suit the season of the year and the varied products and climates of the globe! This will seem the more wonderful, if all the solar light, except this fraction of it, undergoes no change. Whoever, then, would ascribe this adaptation and arrangement to blind, insensate law, may profess himself to be wise, but certainly speaks as a fool. He alone who caused it to rain on one city and not on another, can make the sun to shine and the rain to fall on the evil and on the good, in a suitableness to their condition, and His own unerring wisdom.

Their Variable Action.

To what shall we compare the sun, or how show it to be independent of the power that created it? Could a large heated globe or cylinder, while quickly and steadily revolving, diffuse three distinct kinds of influence, and that in various degrees and in successive periods of time, as need required, and with perfect regularity from any one section of it, unless carefully prepared and regulated, if that were possible, by a skilful engineer? The varied states and functions of the sun, and its admirably changing beams, together with its internal revolutions and the conditions of our atmosphere, will, if duly considered, unmistak-

ably demonstrate the overruling providence of God.

History abundantly records, what is still the experience of all the world, that while the sun invariably shines, and summer and winter, seed-time and harvest do not fail, the genial influence of the heavens are exceedingly unequal. Periods are recorded of dismal darkness and sterility; where much of the sun's wonted light and influence being either withheld or intercepted, scarcity and sickness desolated many lands. And some now living can remember seasons of unwonted bleakness, when food was scarce and high in price, and individuals of irreproachable behaviour were known to have died of hunger. On the other hand, there have been years of plenteousness, nay, seasons in which the heat was so intense that men and cattle fell down dead in our fields. How great, then, is our dependence on the great source of the world's vitality! Through its force and influence, the seasons being genial and warm, vegetation prospers, the fields are covered with corn, and the trees loaded with fruit.

To the world of mankind, the glorious orb of day is as a princely benefactor to a poor beneficiary; and how much greater the benefactor, who is not impoverished by giving, than the beneficiary, whose cry must still be Give, give. All the vital elements of nature come down from above. Hence there is no obvious analogy between the constitution of our dependent globe, and the all-sustaining power of the

ruler of the day. In distributing his riches he gives or withholds as it pleases God to govern and sustain the world.

Comte's Dissatisfaction.

A French philosopher, Auguste Comte, who maintains "the invariable order of natural phenomena," has nevertheless said that "the accurate exploration of the solar system could not but dispel the blind and unlimited wonder which the general order of nature inspired, by showing in the most sensible manner and in various respects that the elements of this system are certainly not disposed in the most advantageous manner, and that science permits us easily to conceive a happier arrangement." Now, of the solar system the chief object is the sun itself. Is it then the body of the sun, or the qualities and distribution of its admirable vital beams, that offend this philosopher? or is he discomposed by its variable action as standing in the way of the cherished dogma of "the fixed, invariable order of natural phenomena?" With this peculiarity of variable action in the solar system he cannot but be dissatisfied, as indeed all must be, who "deny the God that is above."

But do we call in question the order of the world, or the steadfast uniformity of nature's laws? No, in no wise. We believe matter uniformly moves or rests, and is incapable of change, except when change is forced upon it. Let us look at what God has done,

and view things as they are. You cannot make one hair of your head either black or white. What He has made crooked, who can make straight? When, on the one hand, the nature of things requires uniform phenomena and laws, they are so ordained; and when, on the other, variable and subsidiary qualities are required, their operation is equally manifest. Both fixed and variable laws may belong to the same body. In the human body, the blood, "which is the life of man," has both its fixed and variable laws. Its circulation is constant and certain; the force or manner of it is not so. The pulse is quick and strong, or it is feeble and slow; for while it always moves, it does not always move with the same rapidity and force. The great orb which is the life of the world continually shines, but not at all times with the same splendour and efficiency. Though nothing is more certainly established or more conspicuously constant than the sun in his going forth, yet his action and influence are evermore accommodated to the state of the world and the righteous requirements of an overruling providence. And hereby is grandly and delightfully displayed, and that by the same object, and it the greatest and most influential, both the constant and the variable. The seasons duly return, day and night succeed each other; but as to geniality, salubrity, and fruitfulness, we know not what shall be. You cannot from the past foretell the future. There may be points of resemblance; entire uniformity is not pretended. Both the constant and the variable equally pertain to

the great ruler of the day. And hence the states and changes in regard to temperature, light, health, and all things of our sublunary world.

When philosophers would place all the elements of nature, as it were, within a prescribed circle, and represent their operations as an unbroken series of causes and effects, antecedents and consequents, all resulting from the primordial arrangement and constitution of creation, why should they omit to notice the paramount energies of the solar and electric demigods by which the world is governed? But here they are at fault. Those primary and vital forces cannot be subjected to the rule of blind insensate laws; for they are paramount in the universal system, and as ordained by God and regulated by His power, they visibly display variety and adaptation, as well as fixedness and uniformity. An ultimate, unbending, universal physical law, without which their hypothesis is a headless trunk, a body without life, an absolute chimera, has not been discovered, though earnestly desired and hoped for; and even vaunted as hereafter to be certainly found out, and triumphantly forced up by the advance of science from its vexatious concealment. Hitherto, however, they have been in a fix, like a hopeless debtor in the hand of an inexorable creditor. Denying the providence of God, they tenaciously cling to the dreary expectation of an ultimate supreme principle, by which all things are directed and sustained. Might it not seem less irrational, like many of the ancients and some of the moderns, to worship the sun as a god, than to regard

it as sustained and regulated, in both its constant and intermittent and variable functions, by the chimera of an undiscovered law ?

It proves nothing, then, as to the mode of the divine government, to point out the adaptation of earthly and atmospheric substances to one another, and the supposed order of their phenomena ; for seeing there are vast and diverse solar operations which are also exceedingly unequal as to their effects on the world, a government of invariable fixed law must be rejected as not reconcilable with either scripture or science. That the great orb of day, notwithstanding its magnitude and splendour, is itself subject to continual vicissitude, is a manifest acknowledged fact, of which the evidence is independent of both science and theology. Men might as well deny the sun's existence as deny the variableness of its state and influence, and the consequent and universally experienced variableness of its action on sublunary elements.

“That extensive and amazing operations and processes are going forward on the surface of the sun, or in its immediate vicinity, appears from the immense size of both the dark and luminous spots, and the sudden and extensive changes to which they are frequently subjected. It is evident that stupendous powers are going on in connection with this august luminary, far surpassing everything within the range of our contemplation in this terrestrial sphere, of which the human mind can form no distinct conception. These operations appear to be carried forward

in a systematic order, and by the regular influence of certain physical agents." But here we might ask, how can "systematic order" and "regular influence" belong to a succession of irregular and unequal phenomena? And are all agents physical? The writer further adds—"What these agents are, how they produce their effects, wherein they differ in their nature and properties from the physical agents connected with our globe, whether they be employed in keeping up a constant efflux of light and heat to the worlds which roll around, or whether their activities have any relation to *intelligent beings* connected with the sun,—are questions which, in our present state, it is impossible to resolve."

The philosophy that would refer the variety and adaptation of the action of the sun to intelligence and life has truth and reason on its side. We read in the book of inspiration of an angel "standing in the sun," and of another angel "who had power over fire." And though this language should be in part considered figurative, it distinctly recognises the revealed dominion of the great God, and the services and power of "His mighty angels" over all the forces of the inanimate creation.

Recent Discovery by Mr Nasmyth.

Mention may here be advantageously made of a vastly interesting recent discovery. "According to the observations of Mr Nasmyth, the bright surface of the sun consists of separate, insulated, individual

objects or *things*, all nearly or exactly of one definite size and shape—more like a willow leaf than anything else. These flakes, be they what they may, are evidently *the immediate sources of the solar light and heat*, by whatever mechanism or whatever processes they may be enabled to develop, and, as it were, to elaborate their elements from the bosom of the non-luminous fluid in which they apparently float. Looked at in this point of view, we cannot refuse to regard them as organisms of some peculiar and amazing kind, and though it would be too daring to speak of such organisms as partaking of the nature of life, yet we know that vital action *is* competent to develop both heat and light and electricity. Those wonderful objects have been seen by others as well as by Mr Nasmyth. They can hardly be less than a thousand miles in length, and two or three hundred miles in breadth.”—*Sir John Herschel*.

Connecting the fact of those peculiar and amazing organisms with the revealed administration of the angels of God, and their power over fire, light, and every created element, have we not a solution of the varied and admirable wonders of solar action and phenomena, which no theory, however ingenious, that denies revelation can pretend to furnish. Yet as being stationary, and not endued with locomotion, those solar organisms may be not unfitly deemed as mere instruments of living power—possibly analogous in some sort, or in some degree, to the torpedo’s electric apparatus, or the voltaic battery. The per-

fect adaptation of the varied emanations of the sun to the wants and climates of the world requires a corresponding power to effect it. And this power it behoves us to ascribe to the all-wise God, and such living agencies as He is pleased to employ, and not to insensate laws, or things without life, fixed, unbending, irreversible.

There are, besides, in the sun other remarkable phenomena, some of recent discovery, which exhibit not the uniform result of unbending law, but the free action of a supreme Governor. Those, then, who think to place this lower world under one great persistent law, will find it hard to hold the heavens under similar restraint. The diversity of operation which the sun, "that rules the day," so convincingly exhibits can be referred with truth to no other power than that by which it was created. And how distinctly does the glory of the sun declare, not the force of any fixed insensate law, but the supreme administration of intelligence and might! In the constitution of the sun, and in its vast internal and external changes, and its continuously varied action on our globe, how many wonderful phenomena afford the most instructive illustration of the principles by which our world is governed. May it not hence be suggested that a volume on the great and varied subject of solar power and influence by one of our Christian philosophers (and we have many such), would be deemed a valuable boon? As to the preceding observations, however incomplete, they may suffice, in some measure, to show the relation of the

sun to our world, and especially its connection with the seasons and the weather—a deeply interesting fact, which we count it most desirable to place in a clear and convincing light.

THE CREATION OF THE ATMOSPHERE.

THE study of the atmosphere will, we doubt not, yet engage the attention of earnest Christian men more than in times past. It is the element in which they live and perform all the labours of the present state. And, what is a still higher consideration, it is the region in which God, more than in any other, is most manifestly seen as the Ruler and Benefactor of the world. The attentive reader of the Bible will be pleased to see that He who spread abroad the heavens and their host has, in that sacred book, revealed their properties, and uses, and His own dominion over them.

The Mosaic narrative of the creation of the atmosphere claims our special regard, and the more that it has been often misapprehended by biblical expositors, while by the votaries of science it has been generally set aside as unworthy of notice.*

“And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament:

* Recently, in a public meeting of our wise men, “The Chairman said, We cannot allow quotations from the Bible here. We do not acknowledge it to be an authority on scientific subjects.” This remark of the chairman was received with great cheering.

and it was so. And God called the firmament Heaven. And the evening and the morning were the second day."—Gen. i. 6-8.

Now, the term firmament denotes a covering—"something spread out like a curtain, tent, or canopy. The Hebrews understood by it the heavens, which, like a solid arch, served as a bank or barrier between the upper and the lower waters." Though of a liquid or elastic nature, yet is it "strong as a molten looking-glass." Inspired men speak with admiration of this celestial and splendid arch as the work of God, "Who covereth thyself with light as with a garment: who stretcheth out the heavens like a curtain: who layeth the beams of his chambers in the waters: who maketh the clouds his chariot: who walketh on the wings of the wind."—Psa. civ. Isaiah also, as concerning the Holy One who created all things, thus speaks—"He sitteth on the circle of the earth, and stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in."

When, in the beginning, the earth was without form and void—not divided into sea and dry land, not furnished with animals and vegetable products, and darkness was upon the face of the deep—there was no division of the waters, no portion of them was deposited on high. Hence a gaseous expansion must be created, without which there could be no vaporisation, no clouds, no dew, and no rain. Of this new gaseous formation, an essential function was the dividing of the waters from the waters. By its action on the lower waters vaporisation is effected.

This continued process, by which the water of the earth and the sea is carried upward, began prior to the action of the sun on the fourth day. And "experiment proves that water evaporates at all temperatures; for if, in any season, we expose to the air an open vessel filled with water, the water will disappear by evaporation. Even ice sends forth vapours. A piece of ice placed in a balance, at a low temperature, is found to lose weight."—*Kaemtz*. Yet, doubtless, the expansive influence of heat accelerates the process of vaporisation, which, however, steadily goes on at all times, in the darkest night and coldest climate.

Water having once ascended through the air, continues there above the clouds, as a gaseous vapour, to be returned in due time, in the form of rain and snow, to fertilise the earth. The lower waters were called seas. Of the higher it would perhaps be difficult to find any other appropriate designation than that used by Moses, "the waters above the firmament." This designation is adopted by the Psalmist—"Praise him, ye heaven of heavens, and ye waters that be above the heavens."—*Psa. cxlviii*. God, in giving "weight to the winds," and "balancing the clouds," assigned its proper elements and uses to the upper region of the sky when he placed the upper waters there. The element of water is essential in the system of the world. And, as declared by Peter, "the heavens were of old, and the earth subsisting from the water, and by water." Were the higher waters removed, together with the atmosphere, above

which they are placed, desolation and death would ensue, as if the sun itself were extinguished or withdrawn. And if the glorious sun is a fit emblem of God, the atmosphere, by its manifold and vital energies, together with the rain of heaven, convincingly displays the riches of His goodness.

Moses further informs us that "God called the firmament heaven." By this name it is afterwards most usually known, as when we read "the lightning of heaven," the fowls of heaven, the winds, the dew, the rain of heaven. David styles it "The firmament of his strength." "The Lord thundered in the heavens, his lightnings lighted the world. He covereth the heavens with clouds—he prepareth rain for the earth." Through this pellucid aerial envelope He makes "the sun to shine and the rain to fall on the evil and on the good."

The inspired account of the formation of the atmosphere has not secured the attention which its clear truth and evident importance demands. One remarks as follows—"The lower region of the firmament serves to separate the waters of the clouds above from the waters of the sea below." Others, also, understand the words of Moses as distinguishing "the waters in the clouds from the waters of the springs and rivers." To this effect are the words of Hitchcock, in his *Religion of Geology*—"In the account of the creation in Genesis, we are informed how the firmament divided the waters below it, viz., the ocean, lakes, and rivers, from the waters above it, viz., the clouds." (p. 9.) Cruden says—"When the

firmament is taken for the starry heavens, then by upper waters is meant that sea or collection of waters placed by God above all the visible heavens, and there reserved for ends known to himself." And he might have also said—and made known to us. But he adds—"If by firmament we understand the air, then by the superior waters are to be understood the waters of the clouds." "The ancient Jews regarded them as the grand reservoir to be discharged in rain; and also conceived the treasures of the snow, and of the hail, and of the lightning as there laid up for use." And we may here add, that this opinion of the ancient Jews, as to its substantial truth, may be safely placed above all that has been since advanced by either biblical expositors or scientific theorists.

In his "Remarks on the Mosaic Cosmogony," it is satisfactory to find that Mr B. W. Newton admits the obvious and literal meaning of the inspired narrative. "On the second day," he says, "by the creation of the firmament the waters that overlay the earth were divided—part remaining on the earth, the other part being separated off, and by the firmament upheld. The Hebrews believed that there was a mighty mass of water beyond the created firmament and sustained by it. And how could they believe otherwise when they knew not only that Moses had historically declared the fact, but also that David had said—'Praise ye Jehovah, ye heaven of heavens, and ye waters that are above the heavens.'—Psa. cxlvi."

From *Essays*, p. 220, he quotes the following most objectionable words:—"That the Hebrews under-

stood the sky, firmament, or heaven to be a permanent solid vault, as it appears to the ordinary observer, is evident enough from many expressions made use of concerning it. . . . No quibbling about the derivation of the word *rakiah*, which is literally something beaten out, can affect the explicit declaration of the Mosaic writer contained in the words 'the waters above the firmament,' or avail to show that he (Moses) was aware that the sky is but transparent space."—*Passim*.

This bold imputation of ignorance to the man of God, Mr Newton, with reason, pronounces "impious." The language of scripture was used by inspired men and regarded by enlightened Hebrews as now necessarily understood by those who are perfectly aware that the sky is truly transparent space, and not a solid vault. In other climates it looks more like a "molten looking glass" than as seen through a moist, cloudy atmosphere. Extending far on every side, a liquid arch without a cloud, the entire horizon is naturally spoken of as usually seen "like a vault or canopy." If among ancient heathen nations their wise men conceived the earth at a certain height was surrounded by a hollow sphere of solid matter, are we for this reason to ascribe a similar misconception to God's inspired messengers?

While then the blue vault of heaven may be said to mark the boundary which divides the upper from the lower waters, the entire aerial envelope serves as a pure and pellucid medium through which the orbs of light show forth their glory and illuminate the

world. These lights are accordingly said to be set in the firmament—"And God set them in the firmament of the heaven to give light upon the earth, and to rule over the day and over the night, and to divide the light from the darkness; and God saw that it was good." And now the heavens declare the glory of God, and the firmament showeth forth the work of His hands; for herein His power is manifestly shown as the bountiful and all-powerful ruler of the world.

The waters above the firmament being in a buoyant pellucid state, a way must be opened by the hand of God for their descent upon the earth. The clouds, like the flying fowls, are below the firmament, or in "the face of heaven." The upper waters are above the clouds, which, when light and vapoury, ascend and vanish out of sight; but when "full of rain" "they empty themselves upon the earth." By the copious and continued discharge of the waters above the heaven, it has been ever seen how abundant these waters are. When "the floodgates of heaven were opened" and "the rain was upon the earth forty days and forty nights," "the ark went upon the face of the waters." But the rain continued to descend during five months, or "a hundred and fifty days;" "then the windows of heaven were stopped—the rain from heaven was restrained," and the waters of the deep returned,—the wind sent by God over the face of the world would accelerate the return to their place above the firmament of the upper waters.

The division of the earth into zones or climates is effected by the sun. In the torrid zone the sun

shines directly on the earth, so that its rays come down perpendicularly. In the temperate zone they descend more or less obliquely ; while in the frigid, at the poles, the sun does not rise at all, but is below the horizon six months continuously, or above it the same period without setting. Yet however interesting this division of the earth into zones or climates, it is not pointed out in scripture : no mention is made of the equator, the tropics, or the poles. But the formation of the atmosphere to divide "the waters from the waters" is carefully recorded, as a primary and essential arrangement like that of day and night. Now, as the limits of the five zones of the earth are determined by the sun, so is the condition of the firmament by the measure of its heat and cold. For though the entire atmosphere is one liquid undivided ocean, yet with respect to temperature it is clearly divisible vertically, as well as horizontally, into zones or climates, moist or frozen, warm or cold. All the vapour of the world, as diffused in the air, is in either the gaseous and moist state below the firmament, or in the gelid and the frozen state above it. In the lower region, near the earth, water vapour, in the absence of frost, exists in the moist or liquid state. Above this moist or cloudy region all water freezes or ascends in a gaseous form, to be deposited, as it were, in storehouses for the service of the world.

The boundary, or line of march, between the upper and the lower regions of the air is in science called *the snow line*. Above this boundary snow is not dissolved by solar heat, but is always found unmelted

all the year round. A semicircle having its two ends resting on a common level, like the arch of a bridge, might represent the snow line, it being in reality a vast arch which spans the horizon, and whose ends, so to speak, rest upon the poles of the earth.

At the equator, this boundary between the upper and the lower waters is 16,000 feet, or over three miles above the level of the sea, whence, as from the middle of the arch of heaven, it bends downwards to the poles. The humid region of the air being all beneath this arch, as the gelid or the frozen is above it, is comparatively limited and narrow. In our own climate this boundary or "line of eternal snow" is reckoned only 5000 feet in summer, or somewhat more than a mile above the level of the sea.

After water vapour has ascended from the earth, it must needs exist above it, either in the aqueous or gaseous and frozen state; and this depends on temperature. Now, the temperature of the atmosphere in which the vapour of the world is suspended decreases from the equator to the poles, and from its base to its summit. If then, with Dalton, you estimate the height of the atmosphere at fifty miles, and assign an average height of two miles to its lower zone, you leave forty-eight miles as the vertical extent of its high and gelid region, in which the upper waters are deposited.

Now, through the firmament a mutual communication is maintained between the two great divisions of the water of the world, by means of the twofold process of vaporisation and rain. In this state the

waters as at first divided were destined to continue. At the first, evaporation preceded rain,—“for the Lord God had not caused it to rain upon the earth, but there went up a mist from the earth, and watered the whole face of the ground.” Little water could have hitherto ascended to supply rain, and the earth must be supposed sufficiently wet to produce a heavy mist. Henceforth, however, the waters above the firmament are ordained to supply the earth with rain. To bring the deluge on the earth, the windows (the floodgates) of heaven were opened, and the fountains of the deep were broken up; and the rain was upon the earth forty days and forty nights; and, moreover, the waters continued to prevail upon the earth a hundred and fifty days.”

Drs Halley and Whiston attribute the deluge to the influence of a comet passing near the earth. Dick, in his *Christian Philosopher*, well remarks that there is a chemical process in nature by which, if God pleased, the very gases of the atmosphere might be converted into water. Now, if you believe that Moses understood what he has recorded, and that what he has recorded is literally true, you may justly adopt Dr Dick's observation, not as a conjecture, but as truly descriptive of an aerial process without which rain could not at any time descend, nor the earth be irrigated.

Of this extraordinary rain an eminent Christian philosopher has since gravely, but, we fear, inconsiderately, said—“The consideration of aqueous vapour liberated by volcanic throes has been suggested

as the cause of forty days' rain." Now, the Mosaic narrative, which extends the rain to a hundred and fifty days, leaves no room for this unauthorised conjecture. Albeit we may here see that scientific men, and theologians also, have quite misapprehended both the waters above the firmament, and also the force by which they are precipitated. The existence, however, in the higher region of the sky of an incalculable quantity of water, in a vapourized state, clearly establishes the value to the earth of that high extended region whose lowest limit is the firmament of heaven. As to the vapour and the clouds between the heavens and the earth, it cannot well be said to belong to either, and hence you may truly say of it as in the doggerel stanza—

“What is up is up,
And what is down is down;
And what is half way up,
Is neither up nor down.”

Now, though the extraordinary rain of a hundred and fifty days was supplied from “the waters above the firmament,” yet who, looking up to heaven in a cloudless day, or in a clear or starry night, would imagine so great an amount of water to be deposited there. When the deluge subsided, both divisions of the water returned to their places. “And God made a wind to pass over the earth, and the waters assuaged. The fountains also of the great deep and the windows of heaven were stopped, and the rain from heaven was restrained.” And when God gave a sign that the flood should no more cover the earth, did not this

distinctly imply that both the floodgates of heaven and the fountains of the great deep might again be opened to submerge the world? It is hence manifest that at the first creation, when all things were pronounced "good," the immense amount of water which afterwards came down in rain had been placed *above* the firmament, as essentially pertaining to the constitution of our globe and the life of its inhabitants.

The upper waters are accordingly commanded to praise God, as having been appointed to supply rain, snow, vapour, by which herbs and trees, and all the living tribes of earth are nourished and sustained. "Praise him, ye heaven of heavens, and ye waters that be above the heavens. Let them praise the name of the Lord: for he commanded, and they were created. He hath also established them for ever and ever: he hath made a decree which shall not pass. Praise the Lord from the earth. Fire, and hail; snow, and vapours; stormy wind fulfilling his word." —Psa. cxlviii.

To the Jews afterwards, when suffering from drought and barrenness, God said by Malachi, "I will open the windows of heaven, and pour you down a blessing, that there shall be no room to receive it." There was then above the firmament, and there is still there, a sufficiency of water to saturate the earth, and fill the world with the blessings of His goodness.

How carefully soever a system of meteorology may be concocted, it will inevitably involve palpable absurdities if its statements are at variance with the facts of revelation. Yet writers who acknowledge the

authority and truth of the sacred record, are sometimes slow to admit its intimations; hence their confusion and perplexity in regard to the power and providence of God.

Composition of the Atmosphere.

The composition of the atmosphere, as comprising diverse elements and forces, and its constitution as described in sacred writ, afford manifold displays of both creative wisdom and the overruling power and munificence of God, who "ruleth by his power for ever." This province of creation, in which it has pleased God to place all living things, has been described as a vast ocean of gaseous matter enveloping the terraqueous globe. Its height, from the earth to its summit, is estimated at forty-five or fifty miles, nay, vastly more. The height must differ from every point north and south, being greatest over the equator, and least at either pole; which difference is referable, at least in part, to the diurnal rotation of our globe on its axis. As the atmosphere spreads from the earth in every direction, our globe may be compared to a cannon ball enveloped in a sphere of glass. And since in regard to shape an orange may represent the earth, the skin of the orange may represent the atmosphere.

"It is of consequence to understand that the air is not a chemical compound, but a mechanical mixture of several gases. The most abundant of them is nitrogen; the next in quantity is oxygen, on which the chemical qualities of the air chiefly depend. Besides these gases, carbonic acid, hydrogen, and

ammonia are present in small quantity, as well as a varying amount of watery vapour. In 100 volumes of air there are present 79 volumes of nitrogen and 21 of oxygen. In 100 parts by weight of air there are 77 of nitrogen and 23 of oxygen. No difference in the composition of air has been detected in any part of the world, or at the greatest elevations or in the deepest mines."—*Dr Geo. Wilson*.*

The law of gravitation has been supposed to have failed in the atmosphere, because the particles of both nitrogen and oxygen, though unequal in weight, rise alike to the same altitude. "What is still more curious," as the same accomplished chemist remarks, "even gases differing much more in relation to density than those of the atmosphere uniformly mix with each other, although the heaviest be placed lowest. This has been named the force of gaseous diffusion. Carbonic acid is twenty-two times heavier than hydrogen, yet it ascends through it, the greatly lighter hydrogen simultaneously descending through the heavier gas, till ultimately an exactly uniform mixture of gases is effected."

In the constitution of the atmosphere is thus sufficiently indicated "that distinction between gravitating and levitating matter, that position and unrefutable demonstration of the existence in nature of a repulsive force coextensive with, but enormously more powerful than, the attractive force of gravitation."

* This does not apply to the entire atmosphere, from its summit to its base; but only to its lower strata, where life, together with its aliment, was destined to exist.

—*Sir John Herschel.* Now since, according to scripture (Gen. i. 6, 7), there is deposited in the upper sky an immense quantity of water in the form of gas or vapour, which must there constitute a very large proportion of the higher strata of the air, might not this be supposed to add materially to its weight and pressure? But though water as such is eight hundred times as heavy as air, there is not perceived a corresponding pressure of it. It was, however, placed there when at the beginning the Creator “divided the waters from the waters,” and made “the weight for the winds.”—Job xxviii. 25.

The air as well as the sea presses on the earth. At the level of the sea the average pressure is about 15 lb. on every square inch, which is nearly the same as that of a lake 34 feet deep, or a column of mercury 30 inches in height. This pressure is greatest when it can support a column of mercury in the barometer of 30 inches long—diminutions are denoted by the shortening of the column to 29 or fewer inches.

“The atmosphere, in virtue of its compressibility, is so condensed (comparatively) in its lowest strata as that one-third of its total ponderable mass lies within a mile of altitude above the sea level, nearly one-half within two, and nearly two-thirds within five miles—within which last limit the whole would be contained, were it everywhere of the same density as on the surface.”—*Sir John Herschel.* “Aeronauts and mountain travellers have proved that air in which man may live does not extend to ten miles from our ocean level,—probably not to eight. Glaisher and his

aeronaut almost died at six miles or thereabouts, and no other human being has ever ascended to fully five miles. At about ten miles there can be no pressure of air or tension equal to more than an inch of mercury,—there may be a very light gas, but there can be no atmosphere such as we breathe.”—*Fitzroy's Weather Book*.

“It was found impossible to support muscular exertion at any height above the snow line. A few strokes of the hatchet brought the strongest workman to the ground for lack of breath. A race of fifty yards made the runner gasp, or produced a pain in the lungs and a general prostration of strength. Conversation could not be sustained without pain and fatigue, and the pulse throbbed rapidly. Saussure with his party on Mont Blanc experienced exhaustion, headache, and giddiness. Their appetite forsook them, and they were tormented with a burning thirst, which water could only for a short time allay; while at the same time they became quite indifferent to all the concerns of life. The sensations of Humbolt on the Chimborazo were novel and remarkable—large drops of blood burst from under his nails and eyelids, causing him to desist from the dangerous ascent.”

From such views of the atmosphere as ignore the Mosaic account of it, much misconception must arise in respect to both its constitution and phenomena. Is it not manifest from the inspired narrative of the creation, that between its highest and its lowest regions there is a very great difference, even as between the surface and the bowels of the earth? Only on

“the face of the ground” is there food for man and all living creatures, and only in the lower atmosphere or near the earth is life sustained or sustenance supplied. Higher than a few miles above the level of the sea, neither living creatures nor their necessary aliment are to be found. Yet the atmosphere extends to at least forty miles higher. And what can be supposed to fill it, where the cold is intense, and no vitality exists, but the waters above the firmament in the form of gaseous vapour, as they are known to ascend continually from the earth and sea?

It is evident that any facts already ascertained, and any correct views offered of the constitution of the air, are perfectly accordant with the statements of the sacred scriptures. What indeed truly occupies the higher and by far the larger atmospheric space, as well as constitutes its value to the world, is, we doubt not, clearly intimated by the same divine authority which informs us of the first creation of the heavens and the earth, and the deposition there of the upper waters.

In this great atmospheric ocean in which we live, are contained the elements of which all herbs and vegetables and the bodies of all living creatures are known to consist, and by which they are sustained; and therein also are diffused the vital elements of light, heat, electricity and moisture. And while it serves as a storehouse of all the elements of animal and vegetable life, it is at the same time a perfect and powerful machine, by which the Ruler of the world is pleased to carry on the operations of His

providence. Accordingly, whatever constitutes the weather, and affects its changes, or modifies the climates of the world, is comprised in the atmosphere. "The state of the weather at any time depends so much on the state of the atmosphere, that whatever influences that gaseous envelope of the earth, necessarily produces a result which is universal or local according to the nature of the influence; the weather is essentially the state of the air."—*Cornhill Magazine*.

It is through this aerial envelope the sun exerts its mighty power, and diffuses its vivifying influence. Through it, as a medium, the bright orbs of heaven illuminate and cheer the world. Its winds and currents equalise the temperature of the world; and in its higher strata are contained the waters which at the first were separated for the irrigation of the earth. For vaporisation, clouds, rain, dew, the fire we burn, and the light we kindle, we are altogether dependent on the atmosphere. Our ears are formed to hear the sounds conveyed by its undulations. Our eyes are made to behold, through its transparency, the heavens in their glory and the earth in its fullness. It is indeed the heaven of this world, over which God himself presides as the universal Governor and the King of all the earth. Apart from the power and the operation of the beneficent Creator, the inexhaustible depôt and wonderful machinery of the atmospheric ocean would be ungenial and inefficient. And while through the atmosphere the solar emanations, in themselves so powerful and irresistible, are

conveyed to the world, they are, through the same medium, controlled and modified in a suitableness to our need.

Instrumental in Governing the World.

To the biblical student no province of the natural creation is more deeply interesting than the region of the atmosphere. "My opinion of astronomy," says Paley, "has always been that it is *not* the best medium through which to prove the agency of an intelligent Creator; but that this being proved, it shows, beyond all other sciences, the magnificence of His operations." In the region of the atmosphere we live, and move, and act; and, what is greater far, here especially is manifest the power and the majesty of God. Fossil remains and earthly strata and *débris*, no doubt, furnish grave information concerning past eras and events; but in the outspread heavens and their hosts we cease not to behold the actual and continued operations of the living God. Detached from the solid earth, and far removed from the starry heavens, the atmosphere contains within itself the elements and forces by which God is pleased to sustain and rule the world.

In all the dispensations of His providence, whether ordinary or miraculous, the Judge of all the earth has evermore displayed His power in the atmosphere. It is accordingly styled "The firmament of His strength." To the whole human race, in every age and every land, "the heavens declare the glory of God, and the firmament sheweth forth the work of

His hands." "He ruleth by His power for ever." "His strength is in the clouds." When He brought the deluge on the world, destroyed the cities of the plain, inflicted plagues on Egypt, led His people through the wilderness, and not less certainly preserved them in the ages following, continued atmospheric changes and phenomena, suited to their need, made this power manifest. Even heathen nations, quickly as they fell into the deep and deadly darkness of superstition and idolatry, did not cease to be affected by the signs and aspects of the heavens, wherein they could not but perceive distinct indications of power and intelligence. Accordingly, Paul thus reasons with the men of Lystra, "God, which made heaven, and earth, and the sea, and all things that are therein: who in times past suffered all nations to walk in their own ways. Nevertheless he left not himself without witness, in that he did good, and gave us rain from heaven, and fruitful seasons, filling our hearts with food and gladness." By referring to the first creation, still manifest to all, he laid a strong foundation for the doctrine of a continuous and active providence. And David had said before, "Those that dwell in the uttermost parts are afraid at thy tokens; thou makest the outgoings of the morning and evening to rejoice."

Indeed, if the atmosphere, through which the solar elements enrich the world, had been constituted for the special purpose of confuting infidelity, and exploding the chimera of a paramount, supreme, insensate law, it could not have been more adapted

than it is now for such an end. Hence, doubtless, we must reckon it the most eligible battle-field whereon to meet and readily discomfit the impugnors of the doctrine of a divine and active Providence. Now, however, we are told that science only, not the oracles of God, can teach what is true of the works of creation. An eminent meteorologist remarks :—
“Very different views of atmospheric changes are taken by able men, and such subjects may scarcely seem worthy of their earnest attention, because as yet they have not been brought to the verification of a rigid mathematical analysis.” And what more worthy of the earnest attention of mankind, or what more regarded than atmospheric changes?

But however earnestly even able men may labour to bring the changes of the atmosphere to the test of a rigid mathematical analysis, the constant and varied shifting of its elements will evermore elude their utmost power of observation. They tell us, indeed, that “bad weather and bad seasons alternate with fine weather and fine seasons” by the operation of *undeviating law*; but they leave us to find out, as we best can, how such a law can adapt itself, or be adapted to the ceaseless alternations of the weather. Any function or process being changed, either in the earth or in the sky, there must, of necessity, “be a change also of the law.” And if “a fountain cannot at the same place send forth sweet water and bitter,” can the same condition of the sky bring foul weather and fair? or genial and barren seasons? Before men began to teach that all things continued

as they were from the beginning of the world, as if God never interposed, they reasoned very differently. "When ye see a cloud rising out of the west, straightway ye say, There cometh a shower; and so it is. And when the south wind blows, ye say, There will be heat; and it cometh to pass."

Though, in regard to the course of nature and the progress of events, it must be often impossible for us to distinguish the results of intelligence and living agency from the operation or effects of mere insensate forces, it is nevertheless certain, that as respects their origin and cause, these are very different the one from the other. And the system of the atmosphere, which comprises both physical and living agency, is, for that reason, admirably fitted as the instrument of God for governing the world. It is, accordingly adapted not only to the physical but also to the moral condition of mankind. The wars and revolutions of the elements, like the wars of the nations, follow no certain law, but the will of the commander, whose rule is to do what the case requires. But though the conflicts of the elements are so far like military raids and conflicts as to follow no certain order, we are not hence to suppose they are not in harmony with the other powers of nature, as as well as wisely adapted to the state of the world.

What is contrary to scripture and experience, cannot be philosophically true. It is not true that the atmosphere is a regularly moving machine, whose speed and revolutions may be so calculated that you may hope to foretell "every fitful breeze, and every

forming cloud, and every falling shower." Since the beginning of the world, experience has decided, and sacred writ recorded, that the motions of the wind, as pertaining to the government of God, "who hath gathered the winds in his fists," are, with respect to us, pre-eminently fitful, various, inconstant, and altogether so uncertain, that "he that observeth the wind shall not sow; and he that regardeth the clouds shall not reap."

Our weather-wise people might learn from the astronomer in "Rasselas," that the winds of heaven are not under their control, or even subject to their calculations. "Hear, Imlac," he said, "what thou wilt not without difficulty credit. The winds alone, of all the elemental powers, have hitherto refused my authority, and multitudes have perished by equinoctial tempests which I found myself unable to prohibit or restrain."

By the regulation of the seasons, the sunshine, and the rain, mankind are sustained and governed; while by tempests, droughts, famine, pestilence and war, the wicked and rebellious are chastened and restrained. And in the subordinate department of human government, which is "the ordinance of God," the supply of food has been the great concern of wise rulers; for on this the life, order, security and peace of society depend. But all things are of God: "When he giveth quietness, who then can make trouble? and when he hideth his face, who can behold him, whether it be done against a nation or against a man only?"

Seeing that the system of the atmosphere, which so essentially involves the government of God and the welfare of mankind, comprises both physical sequences and the power of intelligence, it is surely not too much to require of scientific men to endeavour to distinguish, as much as possible, the doings and results of living agency from the results and processes of insensate substances—the former as indicated by choice, intelligence and adaptation; the latter as known by what belongs to inert and lifeless things. Between living power and a mere physical process, or what is peculiar to each, considered as a cause, the difference is the greatest possible; the distinction the most obvious and certain of which we can have any notion—it being no less and no other than that of the living and the dead.

Living natures, and above all, the Supreme, can operate upon all created substances, whether solid or elastic. In the atmosphere, as everywhere else, living force can be seen to act in a manner of its own, and altogether different from the processes of lifeless substances. Thus, the ordinary motions of the winds differ evidently from the force and direction given it by “the smith that bloweth the coals in the fire.” And are not, for instance, the vibrations of the air, by which sounds, and speech, and music are produced, the buzz of insect tribes, the songs of birds, whose warbling fills the groves, and the more powerful performances of singing men and women, with bands of instrumental music, very readily distinguished, as well as easily perceived, by

the ear of the listener? Also, in every case, the variety of speech and sound corresponds with the power of the agency by which it is produced. And of what inestimable value is the atmosphere, which is the life of all creatures, especially to mankind, as the medium of knowledge. Our minds are enlightened, our hearts are made glad, by the voice of truth and mercy, the glad tidings of salvation, and the hope of immortality. Could the dominion of the firmament, the work of the second day, on which our life and happiness depend, have been at all committed to blind insensate law? God, in the sacred scriptures, claims the right and power to rule it. "He sitteth upon the circle of the earth, the inhabitants thereof are as grasshoppers." How He sustains and governs all things, is as far above our comprehension as the manner of the first creation. "Thy way is in the sea, and thy paths in the great waters, and thy footsteps are not known." "How little a portion is heard of him! but the thunder of his power who can understand?"

THE BLUE COLOUR OF THE SKY.

THE blue colour of the sky, and the cause of it, are questions of considerable interest; for they involve not only the constitution of the atmosphere, but many various phenomena and benefits which result from the beneficent relations of the heavens and the earth. The admirable constitution of the vaulted sky, and its azure beauty, remarkably display the wisdom and the goodness of the great Creator. Did all the vapour which is lodged in the higher air, and which then assumes a crystalline and icy state, or is universally diffused as a gaseous envelope, still retain its humidity, like the clouds and mists below, no passage being left for the transmission of the sun's rays, neither light nor heat could be supplied to our dark dependent world. But now, "the waters above the firmament," which would, in a liquid state and in the form of clouds, constitute a thick and murky veil, being carried upwards, are transformed into a beautiful transparency, and at the same time constitute an amply replenishing reservoir for watering the earth. And more than this; both the deep blue colour of the sky, and the rich and varied green with which the earth is carpeted, together with the like appearance of the wide sea, are benignly fitted to mitigate the fierce glare of the sun's rays, and to

make it "pleasant for the eyes to behold the light."

Now, although the vault of heaven is all blue, yet the pure air, the medium through which we view it, is entirely colourless. "We do not see the wind." It is, however, erroneously said, that the colour of the azure vault belongs to the mass of the air, and not to anything which it contains. But while the atmosphere below the vault of heaven is all pellucid and pure, and cannot be seen with the eye, all above, being blue, is seen in every direction. "As we ascend from the plains to the mountains the sky appears deeper and deeper. The chamois hunters and the shepherds have long known this. It has been verified on the Alps and on the Cordilleras. In our own climate the sky has the deepest blue when, after days of rain, the east wind drives away the clouds. According to Humboldt, the sky is bluer between the tropics than in higher latitudes, but paler at the sea than in the interior countries."—*Kaemtz*.

Of the scientific balloon ascent of Messrs Glaisher and Coxwell we have this account: "When the voyagers reached the clouds, they found a dense mass of moisture, which was 2000 feet in thickness. These clouds contained as much moisture as they could possibly hold. Having shot through this, they found above them a beautiful, clear, blue sky, with the mass of clouds floating below. This was at about an elevation of a mile and three-quarters, after which no clouds were perceptible." "At heights exceeding three miles, the sky was of a deep Prussian blue."

Now, as to the cause of the blue colour of the sky, it has been attributed to the reflection by the air of the sun's rays. "One part of the luminous rays," it has been said, "is absorbed, the other reflected by the air; it reflects the blue rays, and allows the rays of the red extremity to pass." And it has been also seriously argued that the blue colour of the sky is owing to the combustion of oxygen with hydrogen in the upper strata of the atmosphere. We presume, however, that the azure colour of the vault of heaven may be supposed attributable not to the air itself, for it is altogether colourless, nor to any disturbance of its particles, but to the reflection of the rays of light by the gelid vapour so abundantly and universally diffused in it above the snow line. And what colour is this frozen element known to assume? "Ice and water, when very pure, generally assume a fine green tint, verging to blue."—*Leslie*.

Since from the top of high mountains the blue colour of the sky appears nearly black, may it not be hence inferred that the dark blue of the higher atmosphere is attributable to the density of the vapour accumulated there? Did the colour belong to the air itself, would it not be deepest where the atmosphere is densest, and not where it is most rarefied?

Dr Tyndall, who paid a visit to the neighbourhood of Mont Blanc, at Christmas, 1859, and gave an account of its wintry aspect to the members of the Royal Institution, described a large cavern excavated by the ice. It was finely arched over, and led to a long terrace. The effect of the interior, seen by the

blue light transmitted through the ice, is extremely beautiful. And may not the appearance of this Alpine cave be supposed to throw light on the cause of the blue colour of the sky? Seeing that in both the colour is the same, why should not the cause also be the same? The sky itself, in its abundant store of gelid particles, holds the medium by which its colour is displayed. Dr Tyndall concluded his lecture with observations on the blue colour of the sky, which he attributed to the reflection of the light from a turbid medium with the blackness of the space behind. The cerulean vault, however, is eminently pure and tranquil, and this exquisitely fits it for scientific observation. It is when the sky beneath is clear and cloudless that then, especially, "the heavens declare the glory of God, and the firmament sheweth forth his handywork."

The following description of an iceberg, to which other such illustrations might be added, may not be deemed inappropriate. "While the outside of this heap, covering an acre of surface, is white, with tints of green, touched here and there with what seems to be the most delicate bronze and gilding, every crevice where there is a shadow lurking is a blue, the purity and softness of which cannot be described nor easily imagined. *A pure white surface, like this fine opaque ice, seen through deep shade, produces such blue as one sees in the stainless sky,* when it is full of warmth and life. It is quite beyond the ultramarine of the painter. The lovely marine appears to fill and pervade the hollow." And does not the pure

white surface of the snow-vapour, which is stored in the stainless sky, in like manner produce the lovely azure, "stretched over us as a curtain, and spread out as a tent to dwell in?" We presume the fact is on the whole indisputable. How, indeed, could the greatly extended space "above the firmament," all round the world, evermore, though with some variety, display a rich blue tint, if no colouring element were mingled with the pure and stainless air? But the upper sky is stored with "the treasures of the snow, and the treasures of the hail;" and when these fail, as they must, at the bottom of the gelid blue vault, the sky becomes pale and cloudless, or other bright and varied colours—as yellow, purple, red, are reflected from the rainbow and the clouds, while in the interval between these clouds the atmosphere is altogether clear and colourless. "If you look at a filmy cloud at sunset, you see it bright with vivid light, by reflection from the sun. The sun's rays pierce such a cloud through and through, and are reflected equally from its interior and exterior."

"The gorgeous crimson of the western heavens, and azure blue of the summer midday sky, have been the subject of the researches of Newton, of Goethe, of Clausius, and Brucke. The blue of the firmament is due to reflected light, and the morning and evening red to transmitted light. Professor Forbes has made the interesting observation that steam at a certain stage of condensation is blue by reflected, and red by transmitted light."—*The Lancet*.

As to the rainbow, it is always on the side oppo-

site to the sun. In order to its being painted on the clouds, the sun's rays must fall on its watery vesicles, and be reflected by them. And as it is not by the pure air, but by the aqueous vapour floating in it, the colours of the rainbow are depicted, so, as has been assumed, it is not by the pure rarefied air of the vault of heaven, but by its ample store of gelid vapour, its ethereal and azure beauty is exhibited. Now, however, both the waters above the firmament and the waters beneath it, "gathered together into seas," exhibit the same blue or green colour; and they thus prove the native friendly character of their respective functions, as ordained by the wisdom of the munificent Creator. If, then, the upper air, from the snow line to its summit, is as abundantly replenished as the Mosaic record, together with the process of vaporisation and the abundant rain of heaven testify, the cause of the blue colour of the sky may be presumed sufficiently manifest, and not less so the source whence the rain and the snow are so remarkably supplied. So long, however, as the primary fact is ignored of "the waters above the firmament," as described by Moses, more than one aerial phenomenon will remain an enigma which no principle of science can possibly explain.

THE CLOUDS.

CONNECTED with the vault of heaven, is the phenomenon of clouds. Clouds are formed of water, by the same agency which produces rain, and they are again dissolved by the process of evaporation. Of the manner of their formation much has been said which seems to no purpose, seeing both their sources and the agency by which they are formed are generally overlooked. Nothing is of a less fixed or enduring character than the clouds of heaven; and frequently for a length of time they altogether disappear; the whole horizon is cloudless. Yet, in the economy of nature, they answer most important ends. Clouds are first mentioned in sacred writ when, after the deluge, God made a covenant with Noah. Albeit prior to that great event, especially at its commencement, such clouds and darkness may be supposed to have overspread the sky as must have been exceedingly gloomy and terrific. Even in such tempests as are still frequently experienced, "a day of darkness and gloominess, a day of clouds and thick darkness," has been often known. When the deluge had subsided, God in his mercy made a covenant with Noah, that there should not be "any more a flood to destroy the earth." Of this covenant he was also pleased to give a beautiful and signal token, to be seen upon the

clouds, recently so awfully gloomy and terrific. "And God said, This is the token of the covenant which I make between me and you, and every living creature that is with you, for perpetual generations: I do set my bow in the cloud, and it shall be for a token of a covenant between me and the earth. And it shall come to pass, when I bring a cloud over the earth, that the bow shall be seen in the earth: and I will remember my covenant."

The rainbow was regarded by the heathen as the messenger of heaven; for though they had traditions of ancient events, "the heathen in their blindness" ascribed the rainbow to the gods which their own hands had made. The prophets of Jehovah speak of the Noachic covenant as prefiguring the everlasting covenant of mercy, and a certain sign of the great salvation. John saw round about the throne "a rainbow, in sight like an emerald." "For this is as the waters of Noah unto me: for as I have sworn that the waters of Noah should no more go over the earth; so have I sworn that I would not be wroth with thee, nor rebuke thee. For the mountains shall depart, and the hills be removed; but my kindness shall not depart from thee, neither shall the covenant of my peace be removed, saith the Lord that hath mercy on thee."—Isa. liv.

In the world of nature clouds are essential, but not at all times. "Without clouds there would be neither rain, nor snow, nor hail." Rain, however, has been known to fall when no clouds were discernible. And in passing we may be allowed to say, it is a great and

yet a common error to regard the clouds as the depository of the vapour of the world, and hence to reckon them the source of all the snow and rain. Although they serve many useful ends, and being "full of rain, they empty themselves upon the earth," they were not intended, and are not in any respect fitted, to hold the large division of the water which is placed "above the firmament."

When not so full of rain as to "pour out water," clouds are sometimes so thick and heavy as thoroughly to wet the aerial traveller in his winged chariot. A party of aeronauts in France who traversed such a cloud remarked: "It was an odd sensation, known by those who have climbed high mountains; we were wet to the skin, although there was no rain."

We have often clear and cloudless days and nights both in summer and in winter. In drier climates the azure vault of heaven covers the entire horizon for many weeks together, like a shining tent or canopy, on which no cloud is ever seen. Now, all clouds, whether higher or lower in the atmosphere, being of the same nature as the mists and fogs which encompass us beneath, are also formed by one and the same agency: whether consisting of the humid vapour of the lower sky, or the gelid vapour of the upper sky, and whether arising from the sea as "a little cloud like a man's hand," or "covering the heavens with blackness," they are evermore effected by electric influence. In the normal condition of the atmosphere, or without any special electric influence, the vapour of the world ascends as an invisible gas, and is spread

abroad in the higher regions of the air, and thus, as at the first, the firmament "divided the waters from the waters."

Clouds are divided into classes. The highest clouds, the *cirri*, are so named from *cirrus*, a lock of hair. They are also styled feather clouds, and mare's tail. The next below them are the *cumuli*, so called from *cumulus*, a heap. They resemble hills or mountains piled on one another. Lower down are the straight clouds, from *stratus*, stretched; and also *nimbus*, a rain-cloud, from *nimbus*, a shower. To the *cirrus*, *cumulus*, and the *stratus*, other forms of transition are attached, namely, *cirro-cumulus*, *cirro-stratus*, *cumulo-stratus*.

Climates are affected by the prevalence of clouds. "Abuse as folks may," remarks an accomplished countryman, "the climate of Britain, it is yet unequalled in its picturesque and agreeable variety. I have stood 'neath the deep blue sky of Italy, many a time longing more for a cloud than even for sunshine at home; and not even the hand's breadth film of vapour came to relieve the monotonous bright and blue, or to cast even a shadow on the ground. And here (in Jamaica) beneath a western, burning, mid-day radiance, I have panted for days for a refreshing shower or softening mist, while not a drop has fallen to wet even the stones in the dry river's course, or revive the scorched leaves of the drooping palm or banana; while all the time Britain has its glad-some, mediate variety of sunshine and cloud, and its vegetation, now glittering with rain-drops or

sparkling with sunbeams."—*Memoir of Rev. P. Callender.*

Clouds are ever variable in extent, figure, and duration, and liable continually to be carried by the wind in every direction. Sketch any cloudy region of the sky with the greatest care, and will you ever again see it of the same appearance? Would any future sketch be like its predecessor? Those who talk complacently of a law of storms, might also imagine a law to regulate the clouds. Such as of old relied on their observation of those variable meteors, were liable to miss the proper time of action. The sky of any day or hour is not that of the next, either in calm or stormy weather. The power of the heavens are in the hand of God, who appoints their course and gives those laws by which they act. "He commandeth, and raiseth the stormy wind." There are, notwithstanding, significant aspects of the sky by which mankind may be instructed.

Of these signs of heaven as observed in Syria, Doctor Thomson remarks: "The sun is sinking quietly to rest in the sea, beneath a glowing canopy of crimson, gold, and blue; and there will be fair weather for many days to come. Such signals never deceive, and we can discern the face of the sky as well as the Jews, and the signs of the times far better than did that wicked and adulterous generation, that did not know the day of their merciful visitation."—*The Land and the Book.*

Clouds are higher in summer than in winter. The average height of aqueous clouds is between one and

two miles. The cirri, or feather clouds, which are formed of snow vapour, are supposed to be five or six miles high. At the elevation of 22,960 feet, Gay Lussac saw beneath masses of clouds, by which objects further down were held from view. At that high elevation clouds almost invariably conceal the earth, and currents of the air move frequently in a direction contrary to the wind near the surface of the earth. On the Andes, travellers have seen beneath them the movements of the clouds, the lightning, and tempest, while from the base of the mountain these were seen moving along its lofty sides.

Professor Smyth, at Teneriffe, ascertained that from the surface of the earth up to the level of the grosser clouds, moisture perceptibly increases; but above that level it suddenly and greatly decreases, barring exceptional cases, to more than African dryness. At an elevation of 9000 feet he saw the clouds brought by the trade winds formed half-way beneath his position into a plateau, which extended to the horizon on every hand. The dryness at the upper stories was quite remarkable. No cloud, no mist; the air was a pure azure. Yet in this pure azure, above and around, are laid up in store "the treasures of the snow," which God reserves for sending rain upon the earth.

Clouds are commonly supposed to be formed when the air is saturated or over-saturated by vaporisation. But when vaporisation is most active, and the ascent of vapour most rapid, as in warm and dry weather, the air is least saturated; for then not only does the

vapour of the earth speedily ascend, but mists and clouds, if formed at all, are quickly dissipated.

In Augusta, "the weather from October to Christmas is said to have been most delightful. Not a drop of rain or a cloud was seen for weeks together. The atmosphere was so pure, the air so transparent, that you must enjoy it to appreciate it fully." And can we suppose the immense evaporation of that warm and balmy period all lodged in the clear and cloudless sky below the horizon and not above it, as distinctly stated by the historian of creation? In other sunny regions, during successive months, the sky is clear and cloudless, and the heat so great that the ground is parched, the herbage withered, and the rivulets and pools of water dried up. Seeing the copious and constant evaporation of these dry months goes up invisible in a clear and cloudless sky, must it not be supposed to pass on as a gaseous vapour, and be lodged in the upper regions of the air?

The humidity which is accounted a saturation of the air is, we conceive, attributable to electric influence. *Kaemtz* observes of dew, fogs, rain, as indicating electricity, that "it is very strong when dew is deposited. The signs of electricity are also very marked during fog; the electricity is stronger as the fogs are thicker. When rain or snow falls from the upper regions of the atmosphere, there is, at the same time, a production of electricity more or less strong." The presence of electricity with moisture is made the more manifest from its absence when the air is dry. "M. Theodore de Saussure," he says, "with whom I

passed several agreeable hours, told me that for some days the dryness of the air had been extreme, and the electric signs almost nill." Not less distinctly has it since been remarked, that "even the deposit of dew, the gentlest of atmospheric changes, as well as the formation of mists, fogs, and clouds, and the falling of rain, snow and hail, must be regarded as both consequent upon and causing great electric disturbance."—*Ansted*.

Under strong magnetic influence, the atmosphere is, so to speak, relaxed, and its density diminished. The approach, then, of storms, as indicated by the barometer, must be attributed to the all-pervading and dissolving force of the electric fluid. Is it not thereby that the vapour, which would otherwise speedily ascend as an invisible gas, comes down in mists upon the ground, or is formed in the sky into clouds and rain? And in the case of storms, the same dissolving influence first of all acts on the frozen vapour of the upper strata of the sky, when it forms the *cirri* in which storms have been observed to originate. The distinct understanding, however, of the agency by which clouds, mists, and fogs, and we may add, dew also, are produced, require a full consideration of the source of rain and dew, together with the cause of their precipitation.

And we may here remark, that in the position of the clouds, and in their distance from the earth, may be manifestly seen the hand of God. To this Elihu directs the attention of his friend Job in his deep affliction and perplexity: "Can any understand the

spreadings of the clouds, or the noise of his tabernacle?" "Dost thou know the balancings of the clouds, the wondrous works of him who is perfect in knowledge?" Over all the earth the clouds remain at a certain elevation, between which and the earth the sky is usually open and transparent. Both the clouds which we see in the zenith high overhead, and those which in the distance seem to rest low on the horizon, are alike equidistant from the earth. Persons living or sailing where the distant horizon bounds the view, see the clouds above us as we see the clouds above them, reaching to the ground. This is owing to the earth's rotundity, to which the appearance of the concave heavens necessarily corresponds. An attentive observer of the phenomena of nature and the works of God in many climes, remarks as follows:—"The near apparent transfer of the clouds on the horizon to the zenith, cannot be supposed to make any difference on their relation to the earth's surface.

. . . A practised eye can trace the horizontal stratification to the zenith, and that in their movements, they tend to keep at the same elevation, and otherwise in the same relation to the earth as if they were floating on the surface of an invisible ocean, and that some force of atmospheric movement appears to be requisite to disturb their position. They thus appear to have a specific relation to a certain layer of the atmosphere, upon which they seem to rest or float without any attempt at sinking in it, but accommodate their under surfaces to it without disturbing its proper surface level, any more than

if it consisted of solid glass, whatever extent of cloud may be piled above it. This is always apparent near the equator, and in the undisturbed delta of the great ascending aerial currents, whose phenomena are more immediately under consideration; yet, to account for it on current principles, is impossible by any view of them that can be taken."—*The Universe, a Chemical Problem, by Alexander Anderson.*

Through the atmosphere, as through a glass, we see the heavenly orbs, at best, only dimly and imperfectly. The atmosphere being opaque, and materially dimming, not only is the splendour of the moon and stars obscured, but the dazzling brightness even of the sun itself is at times reduced to a simply shining surface. A serene and pure air, such as may be found above the grosser clouds, is required to behold, not only the heavenly bodies clearly, but also distant earthly objects. To a party of aeronauts at the distance of three hundred miles between the azure and the clouds, the chain of the Alps was distinctly visible; their freshness gleaming in the sunlight. They clearly recognised the form of Mont Blanc—"a remarkable proof of the extraordinary remoteness at which objects can be seen from a great height,"—they also saw a balloon which followed them; it had the same form and proportions as their own, of which it was a vivid and airy reflection.—*Chambers's Journal, Vol. 16, pp. 302,3.*

In 1756, Professor C. Piazzi Smyth and party ascended through mists and clouds on Teneriffe to the height of 10,710 feet. "Then below them was

the upper surface of the clouds extending far and wide like a level plain, shutting out of view lowlands and city and sea, and in their place substituting brilliant reflections of star light, which made the surface of the new mist country (above the clouds) whiter than the snow. A clear blue atmosphere was everywhere above and around them. After the setting of a brilliant sun, the moon glows in whitened light, with a brilliancy never before witnessed; and multitudes of stellar orbs come rushing out of darkness into sight over every part of the sky."

But how different the circumstances of the lower region! "It was," says Professor Smyth, "when our party on the mountain was in the fullest enjoyment of their daily and nightly views of the heavens, that their friends in the town of Teneriffe, near the sea coast, wrote to them most sympathisingly. "Oh! what dreadful weather you must have been suffering! Down here we have had for three weeks the most frightful continuance of storms; constant clouds, rain, and howling winds; and if that was the case with us, what must it not have been with you at the greater height,"—yet, at the greater height and at the very time the air was tranquil and serene, and bad weather confined entirely to the lower depth in the atmosphere beneath the grosser clouds." — *Good Words*, January, 1862.

VAPORISATION.

THE phenomenon of evaporation, if traced from its commencement in the waters beneath the firmament to its termination in the waters above the firmament, as described by Moses, will suffice to show us, whatever the wise may have taught, that as those higher waters produced the heaviest and most desolating rain that ever fell from heaven, so they still continue to supply the world with the abundant drenching rain, which, from time to time, God is pleased to send "upon the earth."

Evaporation and rain are dependent on each other mutually, and their mutual dependence is often mentioned in the sacred scriptures. "All the rivers run into the sea, yet the sea is not full; unto the place where the rivers come, thither they return again." Of this the river Jordan afforded a remarkable example. The water of the Jordan, together with that of many other streams, pours into the Dead Sea, and although it has no outlet, and the exceeding saltiness of its water retards evaporation, yet all this addition to it, from so many rivers, flies off in vapour as constantly as it is supplied. Thus, by the process of vaporisation, the Jordan, and other rivers, return to the place whence they came.

"Dr Halley calculated that the quantity brewed by the Mediterranean alone, during twelve hours of a

summer's day, amounted to not less than 5280 millions of tons." And if so much rises daily, not for weeks only, but even months continuously, how great the amount deposited at the end of that time above the blue horizon !

All the evaporation, however, of all the lakes and rivers of the earth will seem small in comparison of that of the entire ocean, which is three times the extent of the dry land, and to a great degree surmounted by an atmosphere of more than our summer heat. Of God's wisdom in this arrangement, men of understanding were observant. "He that buildeth the stories of heaven, calleth for the waters of the sea, and poureth them out upon the face of the earth ; the Lord is his name." And here you may observe that this vital element, whether existing in the ocean as a part of it, or rising to heaven as an invisible gas or vapour, or dropping down as rain upon the earth, is still designated by its proper name of water, both in the sacred scriptures and in the language of mankind.

"You see," says Dr Faraday, "whether it be ice, water, or steam, it is always to be considered by us as water."

In their praise and adoration, true worshippers could not forget this essential display of God's wisdom and beneficence. "Praise him, ye heaven of heavens, and ye waters that be above the heavens. Let them praise the name of the Lord: for he commanded and they were created ; he hath also established them for ever and ever." They were so con-

stituted by the all-wise Creator, as indispensably to require his constant and continuous oversight. And their successive, varied, and timous evolutions, as clearly manifest His presence as their first existence proves His creative power. No wonder, then, that the heathen sages assigned the dominion of the heavens—the thunder, the lightning and rain—to Jupiter, the chief object of their worship.

Notwithstanding the unceasing and immense evaporation of the earth and the sea, and the consequent great amount of the waters above the firmament and of the rain of heaven, it was long a doubtful question in scientific inquiry, how the rivers of the world were supplied with water. A few admitted the sufficiency of rain to supply the rivers, while the greater number maintained (such and so trustworthy is the infallibility of scientific wisdom), that the water of the sea was returned and filtered by capillary fissures. Doubtless much water is required to supply all the rivers of the earth, some of which are thousands of miles in length, and in breadth and depth like straits and arms of the sea. Yet Dalton, who reckoned the rain of England at thirty-three inches, assigned only thirteen as required to supply the rivers. The Seine is estimated to convey not more than the third part to the sea of the rain that falls into its basin.

By a process, in which we regard the atmosphere as the principal agent, the water of the world is converted into gas or vapour. "There is no distinction of kind, but only of degree, between gas and vapour."

“Water invariably consists of oxygen and hydrogen,” and “when decomposed, for example, by a galvanic current, the particles of hydrogen separate from those of oxygen, and all those of one kind go together; the properties of water cease to appear, those of hydrogen on the one hand, and those of oxygen on the other, become manifest. Now, though the weight of oxygen present is always eight times greater than that of hydrogen; yet, when these gases are mingled, they become uniformly diffused through each other, the heavier ascending and the lighter descending. Even carbonic acid, which is twenty-two times heavier than hydrogen, ascends, while the other descends.”—*George Wilson, Passim*. Accordingly, water in the state of gas or aeriform vapour, will ascend to the summit of the sky throughout its whole extent; and is it not consequently to be regarded as the element of which the higher atmosphere mainly consists? Vapour, as distinguished from gas, is considered as consisting of little globules, bladders, or balloons; of which, in our climate, the ascending velocity is reckoned at about a mile an hour. The upward speed of vapour, must, however, depend on temperature, and not less, perhaps, on the magnetic condition of the air. Under the heat of a tropical sun, the upward progress of vapour is considered most speedy. But, how various soever the degree of its ascending velocity, the fact of its speedy and continuous ascent, is of the greatest importance to our understanding of the ample provision which the bountiful Creator has made for

the subsistence of the earth ; for to all animal and vegetable life, the aliment of water is essential.

Now, though all the water poured on the earth at the deluge still floats above the firmament, yet a way is made for the light to shine through it. Even ice is transparent, and snow is characterised by the whiteness of its texture, and its consequent power of reflecting the light; "so that, in the dry polar regions of the world, the stars and the aurora borealis, aided by the reflection of the snow, enable the traveller, in the absence of the sun and moon, easily and safely to pursue his journey." Even aqueous vapour, when not formed into clouds, permits the light to pass, and show the stars of heaven shining in their glory. But were all the ascending vapour to accumulate, as water vesicles and clouds, in the humid region of the sky, how quickly would it clothe the heavens with darkness, so that neither "sun nor stars" could appear. It is thus, as a prophet saith, "the Lord maketh the day dark with night, and calleth for the waters of the sea." But water vapour being duly carried up into the higher strata of the air, it is then, in effect at least, transformed into a crystalline transparency, and so a way is made by which the light comes forth to illuminate the world.

The vapour of the earth must needs ascend continually, according to the nature of the climate, and then speedily pass into a gelid and pellucid state. Rising from the earth, a light, invisible gas or vapour, through a clear and cloudless sky, it is forthwith added to the treasures of the snow and hail above the

firmament. And here the statements of the oracles of God are in some degree confirmed by observation. "At a certain height over every place, water invariably freezes, and if a mountain rise to this height, it will be covered with snow; all clouds at such a height must consist not of water but of icy particles." —*Chambers's Meteorology*. Hence all the water vapour above the snow line is necessarily frozen, and consequently, in the hottest countries, snow, as seen on high mountain tops, remains undissolved.

Aeronauts, to whom we are indebted for much interesting information, have, at a high altitude, experienced the same intense cold, and observed the same effects of it, as on lofty mountain tops of the same elevation. In their hazardous excursions they have found themselves surrounded by clouds of snow. Welsh and Green attained a height of 23,000 feet, where the temperature was $10\frac{1}{2}$ deg. below zero. In the finest and hottest days, when not a cloud was visible, the balloon was covered with eight inches of snow. And is not this fact decisive as to the tendency of gaseous vapour to ascend through all degrees of temperature, and its lodgment afterwards far above the region of dense clouds and water vapour? And doubtless, at the same elevation and above it, all round the globe, there is an exhaustless treasury of gelid vapour, or the gases of which water is composed.

Scientific Calculation.

The evaporation of the world is, by a careful com-

putation, found to be enormous, so that the true source of rain, according to the declarations of the sacred scriptures, may be satisfactorily ascertained. "Where," remarks Gaussen, "scripture speaks of our atmosphere and of the upper waters, it assigns to them an importance which the science of the moderns alone has been able to demonstrate; seeing that, according to their calculations, the force annually employed by nature for the formation of clouds" (water, in the first instance, is not formed into clouds, but into an invisible gaseous vapour) "is equal to an amount of work which the whole human race could not do in less than 200,000 years." This is the result of Leslie's calculations. "Arago supposes that 800,000,000 form the population of the globe, and that only half that number can work."—*The Plenary Inspiration of the Holy Scriptures, by Professor Gaussen.*

It being a property of water to expand and fly upwards, it is very obvious there cannot be at any time nearly as much vapour in the moist and cloudy region of the sky, beneath the snow line, as rises from the earth in much less than one day; while above it the entire evaporation of days, weeks, and even months, being duly carried up, as by a mighty all-persistent law, is necessarily added to the treasures of snow and hail. And how wonderful that the same element of water, which constitutes more than three-fourths of the surface of our earth, should, in its volatilised state, also constitute the far greater portion of our heavens! And how admirably formed

is the boundary that, as a canopy or curtain, separates "the waters from the waters!"

*Comparative Amount of Vapour above and below the
Snow-line or Firmament.*

In respect, however, to the amount of those upper waters, as compared to the moisture and the clouds beneath—only look at the vaporisation of one lake of small extent. Into the Dead Sea, which is forty-five miles in length, by nearly ten in breadth, six millions of tons are computed to be daily poured by the river Jordan alone. The Arnon, and above thirty other streams, may be supposed to supply at least half as much more. In three months, of thirty days each, eight hundred millions of tons ascend from the surface of this lake, and enter the cold region of the upper sky, while all that is at any time between it and the earth, or in the aqueous and cloudy state, is not more than about half a million of tons. Hence at the end of three dry months, there are many hundred times as much of the water of the Dead Sea above as below the snow-line, or Mosaic firmament. How immense, then, the entire evaporation of all the lakes and rivers of the world, and still more of the vast extended ocean into which they flow!

If you divide the evaporation of only one of our own summer months into two portions, the aqueous or cloudy beneath the snow-line, and the vaporised, pellucid, or the gaseous above it, the difference between them will seem very great. In a month of

thirty days, there are 720 hours. Supposing the vapour of this time to have ascended at the rate of a mile an hour, there is at the end of the month several hundred times as much water above as below the snow-line. As to the East Indies and other tropical lands, there are eight successive months of dry hot weather, with a clear and cloudless sky. The evaporation there being copious and rapid, less than three hours will be deemed more than sufficient for its ascent beyond the region of eternal snow. Or if you limit the dry season of the East to six months only, and divide these into periods of three hours, you have 1440 of these periods at the termination of the dry season of six months. There will be then 1439 times as much water vapour in the volatile or gelid state above the snow-line as beneath it. Now, the extent of this upper frozen region is immensely greater than that of the moist and cloudy space below—average, twenty-three times. Yet the moisture of this comparatively narrow space, “in the form of aqueous vapour or of mists and clouds,” is reckoned the only source of rain and snow. Accordingly, it is said, “the quantity of water distributed over the earth’s surface, after being carried through the air in clouds, is very large, far larger, indeed, than could be supposed without careful investigation.” Yet compared to the quantity comprised in the volatile transparent vapour above the line of eternal snow, how little water is usually seen to float beneath the azure vault. And moreover, this lower space, all round the globe, does not average more than two

miles in height, while the space above it extends to, at least, forty-three, or, according to Dalton, forty-eight miles from the snow-line to the summit of the atmosphere. Besides, the entire horizon, especially in warm climates, is generally clear and cloudless for months together, in which case the waters of the earth must speedily ascend as an invisible pellucid vapour, not to form clouds, but to be added, clear as crystal, to "the treasures of the snow."

As to the quantity of vapour which exists at any time, either in the moist or gelid region of the sky, we readily admit a more accurate calculation might be made. And if by such calculation the amount of the water above the firmament should be somewhat diminished, there must still, it is plain, at least at certain periods and in certain climates, be many hundred times as much water above as below the snow-line or firmament. Undoubtedly, it must be so if the word of God is to be received, which distinctly informs us of "the waters above the heavens," and "the treasures of the snow and of the hail," which indeed is, in a manner, clearly indicated to our senses by the azure beauty of the firmament, and by the benign copiousness with which, as it pleases God, they still pour floods of water upon the earth. "Thou crownest the year with thy goodness, and thy paths drop fatness. They drop upon the pastures of the wilderness; and the little hills rejoice on every side. The pastures are clothed with flocks, and the valleys also are covered with corn; they shout for joy; they also sing."

The equilibrium of the atmospheric elements cannot be supposed to be disturbed, but rather regulated and maintained, by their evolutions and their currents. "He bindeth up the waters in his thick clouds, and the cloud is not rent under them." And so copious is the evaporation and the moisture of the sky in some parts of India, that "the annual evacuation of rain from the atmosphere has exceeded 300 inches, and has been even known to amount to 600 inches, or upwards of 50 feet."

Air and water—the firmament and the waters which are above and beneath it—still remain distinct and separate in both their course and sphere of action. Solomon describes them as performing their respective functions. "The wind goeth towards the south, and turneth about unto the north: it whirleth about continually; and the wind returneth again, according to his circuits. All the rivers run into the sea; yet the sea is not full: unto the place from whence the rivers come, thither they return again." The whirling of the winds may modify, but cannot stop either the upward or the downward motion of the waters; nor can the waters in their progress arrest the whirling of the winds. The two elements being differently constituted, their respective spheres of action require to be distinct. However they may seem to interfere, each fulfils the end of its creation; and what power but that of God could worthily conduct the vital elements on which the world and its inhabitants depend? And shall we turn away from the contemplation of the wisdom that rules the

heavens and the earth, and ascribe the great Creator's works of power and beneficence to idols of our own creation, and laws of our own devising, and not rather gratefully and adoringly exclaim, "O Lord, how manifold art thy works! in wisdom hast thou made them all: the earth is full of thy riches."

PRECIPITATION OF RAIN.

ACCORDING to the doctrine of Moses, an important division of the water of the world is lodged above the firmament, in the high region of unmitigated cold, where it must needs remain, until dissolved and sent down by a delegated and specific agency—"the lightning of rain." So soon as this potent agency, which is waiting to be employed, is commissioned to dissolve "the treasures of the snow," their descent forthwith necessarily follows. The constitution, however, of the atmosphere, together with the forces which belong to it, are not viewed by men of science as Moses represents them. And hence the conclusion is speedily adopted, that science must be right, and "the man Moses" under a mistake. Nay, if the Bible teaches anything anent the works of God, and philosophy quite another, then, without any doubt, the latter must be received as unquestionably true, and the former rejected as of no authority!

The following extract will sufficiently show the result of scientific inquiry in relation to the source of rain:—"Seeing that water is many hundred times heavier than air, by what means, it has been asked, does it climb into the atmosphere, and continue floating in the thin altitudes which the cirri undoubted attain. How is the vapour condensed into

particles, which become visible to the eye, and compose the various species of clouds? Are these particles drops of diminutive size—mere water dust, if we may so speak; or are they vesicular—that is, little balloons, consisting of an aqueous film, with air or vapour enclosed? What is it that compels them to condense, and occasionally to descend in torrents, accompanied by fearful explosions of electricity, or to freeze into lumps of ice, as large as oranges or pumpkins? These, with many other questions, have been thorns in the sides of meteorologists, which theorists have endeavoured to extract, with various degrees of skill.”—*Quarterly Review*.

Now, the commonly received hypothesis on this deeply interesting subject still contains abundance of those philosophic thorns. It, of course, differs from the statements of the Bible, wherein we should seek for them in vain. If its information had been received as explicit and reliable, or if science had succeeded in framing an intelligible and convincing theory, would an eminent writer, philosopher, and theologian have lately said, “I know little or nothing about the weather. God knows by what means these rains are produced: I do not.” Now, the means and production of rain are distinctly and often represented in the sacred scriptures; and even science is found occasionally to confirm the perfect truth of the oracles of God. In the following pages the respective statements of both scripture and science, will, it is hoped, fairly be placed before the mind of the reader.

Scripture Account of the Production of Rain.

In the book of Job, which is generally deemed the oldest written record in the world, being the first written of the sacred oracles, we have a clear description of the source and cause of rain. It is in the words of the Most High himself to His servant Job, who was an eminently studious observer of the works of God, and enjoyed the advantage of a fair and steady climate, in which the phenomena of snow, hail, clouds, lightning and rain, are often powerfully exhibited. All the year round snow lay conspicuous on the lofty mountains of the East. *Lebanon*, which signifies *white*, was so called because its lofty summits, rising to the height of ten thousand feet, are perpetually clad in snow. Near this famous mountain was the residence of Job.* In such a locality observing men could surely understand, as distinctly told them, that only a very small portion of the vapour of their hot and dry seasons could have remained as snow on their mountain tops, and that by far the greater part must have been carried up, and deposited in the pure extended azure space "above the firmament."

At that early age, mankind had not all declined

* Dr Thomson, in his valuable work "The Land and the Book," does not doubt "the fact that the region to the east of Huleh was the land of Uz, the home of Job." "The tradition of antiquity was to that effect, and I see no reason to question it. To ridicule the extravagant mania for pilgrimages in his time, Chrysostom says that many people have made long journeys into the Hauran, to visit the dunghill upon which the patriarch sat. This shows the opinion of that early day in regard to the land of Uz, and modern research confirms the tradition."—P. 251.

into barbarism. The history of the creation and the deluge was yet fresh and entire in the recollection of men of intelligence, and such especially as still confessed and worshipped the true and living God. Would they not attach its proper meaning to such phrases as, "the waters above the firmament," and God's opening "the floodgates of heaven?" Atmospheric phenomena, of vast extent and splendour, would not be overlooked by a people who rather exceeded than came behind in the observance of "the signs of heaven." In the rainy seasons of the hot and sunny climates of the world, clouds, lightning, and thunder rend the heavens, and then the rain cometh down in torrents, and sometimes with a force that brings the fowls of heaven to the ground. It could then be truly said, "The clouds poured out water: the skies sent out a sound: thine arrows also went abroad. The voice of thy thunder was in the heaven: the lightnings lightened the world: the earth trembled and shook."—Psa. lxxvii. Our instruments of scientific investigation are not to be compared to the facilities afforded in the great laboratory of the world of nature for the observation of the clouds, the lightning, and the rain.

Yet some even of our scripture expositors are pleased to remind us, that "the laws of nature were not known in Job's time." And are they all yet known? Do scientific men, or do learned commentators understand them perfectly? It will, we hope, be found, that Job's representations not only accord

with scientific truth, but bear the impress of the high authority of divine inspiration. The Creator, who knew His own works, could surely make them known to men. Who can imagine that God, speaking of them in His word, does not inform us perfectly? "When," remarks Professor Gaussen, "scripture speaks of the air, the weight of which was unknown before the time of Galileo, it tells us that, at the creation, God gave air its weight, and to the waters their just measure. Although before the invention of the barometer it was not known to have weight, yet now its weight is known as well as that of mercury or water." Moreover, God has determined the weight of water-clouds, and they are balanced in the sky, a fact still puzzling to meteorologists. They must be weighed in the finest scales, whether they appear at rest, or soar invisible as a gaseous transparency, or descend as mists upon the ground. Job xxvi. 8; Psal. civ. 3.

The fact of the vapour of the world (save a comparatively small proportion existing in a gaseous and pellucid state above the visible expanse) being clearly established, an agency is required by which it shall be so dissolved and condensed as to come down from its airy elevation to form clouds, which, when "full of rain, empty themselves upon the earth." The frosts of winter are dissolved by solar heat, but quite another agency is required to melt the treasures of the snow. In relation to this needful agency, the language of holy writ is distinct and uniform. "He causeth the vapours to ascend from the ends of

the earth; he maketh lightnings for the rain; he bringeth the wind out of his treasures."—Psa. cxxxv. 7. "When he uttereth his voice, there is a multitude [a sound] of waters in the heavens, and he causeth the vapours to ascend from the ends of the earth; he maketh lightnings for rain."—Jer. x. 13. "Ask ye of the Lord rain in the time of the latter rain; so the Lord shall make bright clouds [lightnings], and give them showers of rain, to every one grass in the field."—Zech. x. 1.

To this exercise of His power in the regulation of the elements, God directs the mind of Job, and we, too, may here see the hand that rules the world. "Hast thou entered into the treasures of the snow; or hast thou seen the treasures of the hail; which I have reserved against the time of trouble, against the day of battle and war? By what way is the light parted, which scattereth the east wind upon the earth? Who hath divided a watercourse for the overflowing of waters; or a way for the lightning of thunder; to cause it to rain on the earth, where no man is; on the wilderness, wherein there is no man; to satisfy the desolate and waste ground; and to cause the bud of the tender herb to spring forth? Hath the rain a father? or who hath begotten the drops of dew? Out of whose womb came the ice? and the hoary frost of heaven, who hath gendered it? The waters are hid as with a stone, and the face of the deep is frozen. Canst thou bind the sweet influences of Pleiades, or loose the bands of Orion? Canst thou bring forth Mazzaroth in his season? or canst thou

guide Arcturus with his sons? Knowest thou the ordinances of heaven? canst thou set the dominion thereof in the earth? Canst thou lift up thy voice to the clouds, that abundance of waters may cover thee? Canst thou send lightnings, that they may go, and say unto thee, Here we are? Who hath put wisdom in the inward parts? or who hath given understanding to the heart? Who can number the clouds in wisdom? or who can stay the bottles of heaven?—Job xxxviii.

Now, supposing this comprehensive extract from the book of Job (and it contains many to the same effect, chap. xxxvii.) not a part of scripture, but of some philosophic tract of ancient times, perhaps the oldest in the world;* should we not understand it as meaning that the accumulated vapour of the earth, ascending to the higher regions of the air, there remains unchanged, and incapable of coming down in the shape of rain, until acted on, and sent

* The value of the book of Job is not easily estimated. The following notice of it merits high regard. "Biblical critics seem agreed that our own book of Job was written in the East. I call that, apart from all theories about it, one of the grandest things ever written with pen. A noble book; all men's book! It is our first, oldest statement of the never-ending problem—man's destiny, and God's ways with him here on earth. And all in such free, flowing outlines; grand in its sincerity, in its simplicity, in its epic melody, and repose of reconciliation. There is the seeing eye, the mildly understanding heart. So true every way; true eyesight, and vision for all things—material things no less than spiritual; the horse—'hast thou clothed his neck with thunder? he laughs at the shaking of the spear!' Such living likenesses were never since drawn. Sublime sorrow, sublime reconciliation; oldest choral melody, as of the heart of mankind. So soft and great, as the summer midnight, as the world with its seas and stars."—*Carlyle*.

by some dissolving force? In those high regions of intense and unmitigated cold, there is no solar agency to dissolve and condense the frozen vapour, and cause it to come down to fertilize the earth. Cold currents of the air may carry it about, but they can neither elevate nor depress it. Now, though the air is rarefied as you ascend, and becomes continually lighter, yet aqueous vapour there accumulates, and there also with the altitude and the accumulated vapour the strength of electricity increases; and its discharge in the clouds, in the form of lightning, makes manifest both its strength and the large amount of vapour which is there deposited. It is then evident that, as clearly taught in scripture, only by the action of the potent fluid rain is precipitated.

Scientific View of the Precipitation of Rain.

The scriptures, we have seen, speak of "the waters above the firmament," and of "the treasures of the snow," as the source of rain; they also uniformly teach that the lightning of heaven is the means of its precipitation. Science usually places the whole subject in another light. It finds the source of all rain in the *aqueous* vapour of the clouds, and finds the cause of its precipitation in the abstraction of latent solar heat, to which they also add the conflict and intermingling of atmospheric currents.

In the following quotations this commonly received hypothesis is distinctly set forth. "When air, saturated with vapour, is cooled, it causes the vapour contained in it to contract, and be precipitated either

in rain or in mist; thus the earth is supplied with moisture." "Moisture," observes another, "is precipitated in the atmosphere into the visible form of clouds and rain when a diminution of atmospheric temperature takes place." A third "conceives that evaporation draws up from the seas and rivers of the earth vast quantities of water, which are stored in the hollows of the clouds, and descend, when the heat is exhausted, as dew, and rain, and snow." To all this it is added, "The vapour of the air is condensed, so as to form rain, when two or more volumes of humid air, differing considerably in temperature, unite." In all this no account is made of electricity, or of the large amount of vapour, which, having passed beyond the snow-line, is frozen and volatilized in the high region of unmitigated cold.

By this hypothesis the earth is made to depend for rain on the watery vapour which floats beneath "the firmament," or the limit of eternal snow. To the moisture contained in this comparatively narrow zone below the firmament, our attention is exclusively directed as the source of all the rain that falls upon the earth. Accordingly, it is said, "The vapour of the atmosphere, although very trifling in amount, is of immense importance in its effects. Unlike the gaseous, it is easily reduced from the aerial to the liquid form [is it not gaseous? and what reduces it?], or to water, as we usually find it; and it is constantly going through the process of becoming liquid, and descending to the earth, and again rising into the air in a gaseous or invisible form."

Further, it has been said, "When, from continued evaporation, the air is highly saturated with vapour, though it be invisible and the sky cloudless, if its temperature is suddenly reduced by cold currents descending from above, or rushing from a higher to a lower latitude, its capacity to retain moisture is diminished, clouds are formed, and the result is rain. Air condenses as it cools, and, like a sponge filled with water and compressed, pours out the water which its diminished capacity cannot hold. How singular, yet how simple, the philosophy of rain."—*Scientific Journal*.

To the above hypothesis of the precipitation of rain through the abstraction of the latent heat of vapour, Hutton and many others have made a material addition. "When," say they, "two masses of saturated air of unequal temperature meet, there is a precipitation of aqueous vapour. If the two masses are not in a state of saturation, they nevertheless become moister, and if the temperatures are very different, there will even be a precipitation although the two masses of air might not be saturated." Now, is not this a very gratuitous hypothesis? for of such masses and currents of air, and their saturation and results, what do we know? By the contact and commingling of aerial currents, their temperature and that of the moisture they contain would indeed be modified, but would this effect the fall of rain? Does not watery vapour continually pass upwards through all degrees of temperature, while no rain is thereby produced? Does it not thus constantly

ascend for successive days, and even weeks or months, in summer and in winter, while the air is dry and the sky clear, and yet neither rain nor snow is seen to fall nor clouds to float in the sky?

The hypothesis of Hutton is opposed to the known properties of vapour. For such are the elasticity and mutual repulsion of its watery vesicles, that neither the cold nor the heat of the atmosphere accounts for their coalescence. The meeting of two currents of air—a very frequent occurrence—does not combine either their gaseous or aqueous particles. “It is perfectly safe to assume that the distance between two adjoining particles of common air is not less than a hundred times the breadth of one particle.” But its watery vesicles are still more widely separate. Accordingly, it is “deemed almost certain that every particle of a cloud, when it is first thrown out into the visible shape, must be apart from the particle next adjoining several hundred times its own breadth.”—*Chambers's Meteorology*. How, then, are such particles to meet and coalesce? How can they be supposed to divest themselves of their elasticity and mutual repulsion, so as to unite together and fall down as rain? Besides, such a saturation of the lower atmosphere by those widely separated vesicles as would supply the world with rain is a manifest chimera.

In whatever degree of cold you suppose moisture to be condensed into clouds and rain, it is evident that through the same degree of cold it is continually passing from the entire surface of the globe to the

gelid strata of the air. Moreover, all the vapour which at any time exists in a moist condition ascends from the earth beyond the snow line during the short space of two or three hours, or a still shorter time. Would this small amount of moisture suffice to fill the sky with clouds and to pour floods of water on the earth, such as overflow the regions of the torrid zone ?

Watery elastic vesicles, being widely separated and mutually repellent, are not brought together and united by either solar heat or polar cold. Within the tropics solar heat neither combines nor disperses them, nor does its absence result in forming them into either sleet or hail. Heat indeed conduces to transform water into vapour, albeit cold alone does not change vapour into clouds and rain. Heat performs a thousand functions which cold cannot counteract.

The chemical formation of water, by the combination of its constituent gases, entirely accords with the scripture account of its production in the sky. "When the gases oxygen and hydrogen," says Dr Wilson, "are mingled together, they become uniformly diffused through each other, but no chemical combination occurs between them. If, however, a light be applied to the mouth of a vessel filled with the gases, mixed in certain proportions, or an electric spark be sent through the mixture, great evolutions of light and heat occur, a sharp report or explosion is heard, and the gases become changed into steam, which, as it cools, condenses into water. The oxygen and the hydrogen are now said to have entered

into chemical combination, and to have formed water."

The difficulty, though not the fallacy, of the theory which refers the phenomenon of rain to cold is well stated in the following quotation :—"The evaporation from the ocean and the earth's surface, which produces the elastic moisture which rises in the atmosphere, and is apparently the source of clouds and rain, is a constant process obvious everywhere ; but the converse process, that removes the large amount of heat known to exist in elastic vapour of water before it can be condensed into clouds, is as yet altogether unknown. A cooling power, equivalent in all respects to the heating power of the sun upon the earth, is obviously required for this purpose, but where to find it is not more apparent than their resting-place."—*The Universe, a Chemical Problem*, by Alex. Anderson, p. 42.

The precipitation of rain by the lightning of heaven consists with the fact of the condensation of water vapour by cold. Heated vapour is evidently thus condensed. At an assembly at Petersburg, the room being over warm, the windows were opened to admit fresh air, when presently, it being winter, a shower of snow came down. Of steam vapour, when cooled, part descends as dew, while part flies up and disappears. But in the case of rain, gelid vapour is brought down from a high elevation of intense cold, and condensed in the milder region of the clouds. Hence it appears that while on the lightning of heaven the precipitation of rain is essentially dependent, &

certain degree of cold is required in the process. And this accords with the connection, or, may we say, the sympathy which, as elsewhere remarked, exists between electricity and cold.

With respect to rain as resulting from a south-west wind, it has been said that "a current loaded with moisture flows from the equator to the poles along the high regions of the atmosphere, and at too high an altitude to deposit its moisture near the tropical belt; but entering into a lower level and a cooler climate it then pours down a drenching rain." But how does all this appear? Does the vapour of the tropics, instead of continuing its ascent, bend its course downwards as it advances to the poles? Clouds, we know, are carried about with the wind; albeit gaseous elastic vapour continually flies upwards, and loses all its humidity above the snow line. A current of aqueous vapour, supposed to flow from the equator to the poles, must first mount up above the limits of eternal snow, where every tendency to fall down as rain entirely ceases. As to the aqueous vapour which comes down as showers when a warm moist wind blows from the ocean, it would as readily ascend, as it generally does, unless precipitated by electric influence, as well as condensed by the influence of cold. And with respect to the moisture that constitutes the heavy drenching rain of the tropics, and overspreads entire continents with water clouds, whence comes it? Not surely from a warmer region, nor from the moist winds of the ocean; but from "the waters above the firmament."

“God understandeth the way thereof, and he knoweth the place thereof. For he looketh to the ends of the earth, and seeth under the whole heaven; to make the weight for the winds; and he weigheth the waters by measure. When he made a decree for the rain, and a way for the lightning of thunder.”—Job xxviii. 23-26. The higher strata of the atmosphere, and their buoyant treasures of pellucid vapour, may well excite our adoration of creative wisdom. They were not made in vain, and they are not now of minor consequence. Where you have assigned a space of two vertical miles to the aqueous and cloudy vapour below the firmament, there still remain forty-eight miles—or indeed a far larger space—above that boundary, for the “waters of the upper sky.” The treasures of the snow and of the hail are so distributed and spread abroad in the heavens, as to supply all the countries of the world with rain in a suitableness to their need. While, however, the water of the earth ascends as it were with the force and regularity of law, it does not so descend. Its descent is not regulated by undeviating law, but by the fiat of Omnipotence. God sendeth lightnings for rain. And this the true worshippers of God were early taught and still believe. “When the heaven was shut up in the days of Elijah, that prophet did not pray either to accelerate or stop evaporation, which is regular and constant, but he prayed that it should not rain, and it rained not on the earth by the space of three years and six months. And again he prayed, and the heaven gave rain and the earth brought forth

her fruit." Did this variety and contrast both result from some one dominant, persistent law? Was it not the will of God, with whom are causes and effects, whether uniform and periodical, or variable and uncertain?

Notwithstanding their adoption of an untenable hypothesis, scientific men abundantly corroborate the statement of the Bible. The enormous evaporation of the world, as shown by the calculations of philosophers, perfectly accords with the large amount of "the waters above the firmament" as made known by Moses. And the mass of frozen vapour and snow storms by which aeronauts have been encompassed readily reminds us of "the treasures of the snow" mentioned by the Lord himself to his servant Job. These frozen treasures are dissolved and precipitated "when God makes" a way for "the lightning of thunder," to cause it to rain on the earth. Science now is in part inclined to assent to this. "It is becoming more and more certain that the phenomena of storms, hail, and snow, &c., are intimately connected with the electric condition of the atmosphere." The waters of the world cannot be dissociated from magnetic influence. The great ocean itself is a reservoir of electricity. And Gay Lusac, at the height of 22,960 feet above Paris, or upwards of four miles above the equator, perceived the magnetic influence existing as on the earth's surface, and that the air consists of the same elements as the lower strata.

The *cirri*, which are the highest clouds, sufficiently indicate the action of electricity. Without the

thermal action of this fluid, how could these high clouds be supposed to have been formed? Now, storms are observed always to begin with the *cirri*. From them the lightning is seen to pass *downwards* to the *cumuli*. The gelid vapour of the upper sky being reduced by the thermal force of electricity, presently descends to form the thick clouds whence rain is precipitated, and which are accordingly observed to be fed by *currents from above*. "When a thunder-storm commences, a low dense cloud begins to form in the atmosphere that was formerly clear. This cloud increases fast *only from its upper part*."—*Dr Thomson on Heat and Electricity*, p. 442. "A party of French philosophers, from the summit of the Andes observed *clouds descending*, and gradually assuming the appearance of thunder clouds as they approached a lower level, which ultimately gave birth to a thunder storm upon the places beneath." A chief object of Mr Glaisher's ascent in July, 1863, was "to determine whether there was another stratum of cloud above that from which rain was falling." According to Mr Green's deduction relative to rain—"That whenever a fall of rain happens, and the sky is overcast, there will be invariably found to exist another stratum of clouds at a certain elevation above the former"—his conclusion is that there is a second stratum above that from which rain is falling. Evidently, then, the gaseous and frozen vapour universally diffused in the higher strata of the air, when touched by the electric fluid, hastens to augment the water clouds below, which, "when full of rain, empty

themselves upon the earth." And we may remark in passing, that rain thus dropped from the clouds may again be congealed into snow or hail in passing downwards through a colder stratum of the sky.

Kaemtz ascribes a high altitude to storms. "Storms," he says, "*commence with cirri*. When these become thicker, or when one or several strata of *cumuli* exist beneath, then these clouds make a mutual exchange of lightnings. We must therefore assign to storms a great height. This assertion is quite in contradiction to the received opinion of the moderate height of electric clouds. On the Alps I never saw storms beneath my feet: the whole mass was overhead. I was sometimes enveloped in clouds, and the thunders and lightnings burst forth at no great distance from me; but I found myself merely in the lower part of the stormy mass which exchanged sparks with the higher mass." "If storms," he adds, "were as low as the majority of travellers maintain they are, they could not so easily travel through the lofty chains of mountains. The inhabitants of the valley of Chamouni assure me that storms frequently pass above the summit of Mont Blanc (4810^m.)" Now, the summit of this mountain is 7000 feet above the limit of eternal snow. "De Saussure, during his stay of thirteen days on Col de Geant, at the height of 3428 metres, was struck with the frequency of hail and sleet, which he observed eleven times. *Balmat* experienced a shower of hail during the night that he passed on Mont Blanc; and *Piccard* found much hail beneath the snow with which the summit is

covered. *De Saussure* hence concluded that sleet is formed in the high regions of the atmosphere, and that it is transformed into hail during its fall. And *Welden* says that rain in the plains are hail and sleet in the mountains."—*Kaemtz's Meteorology*, p. 481.

In regard to the height of storms, the information of this philosopher is ample and valuable. "A storm," he observes, "is frequently formed for hours before it bursts forth." "The barometer continuing to fall, *cumuli* are formed in the lower parts, and the rain begins. The *cirri* of the elevated parts of the atmosphere pass into the state of *cirro-cumulus*, and the *cumuli* form a mass of *cumulo-stratus*; which is clearly to be seen, especially when a storm is formed in the horizon. In general the barometer falls slowly for a day or two. The vapours then condense in the higher regions of the atmosphere, and contribute to increase the volume of the *cirri*; and *cumuli* are formed below, which pass into the state of very dense clouds." Those clearly stated facts are not the less worthy of regard that they are subversive of the theory which ascribes the fall of rain to a diminished temperature, and which is the theory of *Kaemtz* himself.

His translator, Mr Walker, in noticing *M. Tesson's* views of "the hydro-meteorological phenomena concurrent with a violent discharge," adds—"I must confess to a partiality towards this view which takes for granted that the lightning precedes the rain. *M. Kaemtz* is of a contrary opinion: he conceives, as we see in the text (p. 368), that *the storm produces the*

electricity, not the *electricity the storm*. The question of priority is of considerable moment"—(might he not have said, is essential, and of the greatest moment?)—"to a true and satisfactory view of the entire subject of meteorology."

The following experiment, as noticed in the *Builder*, is worthy of attention. "Mr Weeks, of Sandwich, writes as follows to Mr Rowell, who, at the British Association, suggested the possibility of bringing down rain from the clouds:—'I have from very early life been an assiduous experimenter with electric kites, atmospheric wires, &c. Now I beg to assure you, that it has several times happened that when my kite has been raised immediately under a distended, light, fleecy cloud, at a moderate elevation, a free current of sparks has passed from the apparatus during some ten or twelve minutes. I have suddenly found myself bedewed with a descent of fine misty rain; and, on looking up, have seen the cloud upon which I was operating surprisingly reduced in magnitude.'"

Those phenomena, which occur in the high and frozen region of the atmosphere, and above the sphere of water clouds, show, first, that in high regions of unmitigated cold is universally diffused the vapour and gases which descend as sleet, and hail, and rain upon the earth; and secondly, that the principles elicited by these phenomena entirely set aside the hypothesis which ascribes the fall of rain to a diminished temperature, for it begins to fall when the cold is intense. When the cold is below zero, heat must

be *applied*, not *abstracted*. And what but the thermal influence of electricity could dissolve the accumulated frozen treasures of the sky, and send them down to fill the clouds by which the thirsty ground is saturated?

The terrific lightning and thunder of the tropics very manifestly show to what we must ascribe their heavy drenching rains. A West India tempest is thus described,—“The sun had just set with all the suddenness and grandeur of a plunge beneath the horizon, and we were instantaneously in darkness—darkness almost *felt*, owing to the lurid blackness of the clouds that were, as it were, hurrying to their posts in the firmament preparatory to the strife. The storm soon began. The first symptoms of the elemental war was the blinding flash, and a discharge of thunder-peals, that seemed to shake the very house. And now our voices were scarcely audible to each other as the rain beat furiously—(of a truth it never rains here, but pours bucketful fashion.) Flash followed flash, brighter than the lights upon our tables, and peal succeeded peal almost uninterruptedly, and the rain came down as if in ire at its being so long held back. It was well replied by a negro, during the storm, to his master, as, listening to the storm, he remarked, ‘There go the great *guns*.’ ‘Yes, massa, dese be God’s great guns; dare be only *one* hand able to work dem—God’s own.’”—*Memoir of the Rev. Thomas P. Callender*.

The approach and fall of rain clearly enough indicate the mode of its formation. Ordinarily, when it is general and heavy, the heavens gather blackness,

then follow lightning, and thunder, and rain. It was always so. Thus, after a severe and continued drought of three years and a half, "It came to pass that the heaven was black with clouds and wind, and there was a great rain."—1 Kings xviii. 44. And whence those clouds, and that great rain? Not certainly from the scanty moisture then ascending from the parched earth and dried brooks of Syria, after three years and six months of drought, nor from any unusual vaporisation of the sea; but from the accumulated waters of the upper regions of the sky, stored up above the firmament, till God should be pleased, in answer to Elijah's prayer, to send rain upon the earth.

The preceding facts, as adduced by scientific men, added to the more reliable information of scripture, sufficiently enable us to understand how the changes of the sky are regulated, and the priceless blessing of the rain of heaven sent as promised in the word of God. It is of the more importance to understand this, that the current hypothesis, which recognises neither the waters above the firmament, and the treasures of the snow, nor the mighty agency by which it is dissolved and distributed, begets a blind and scornful prejudice against the information and authority of divine revelation, as if it were (or could be) opposed to the principles of true science.

The fact mentioned by the prophet Amos, of its raining on one city and not on another, is strikingly observable in our own country. "The district above Galashiels, and all intermediate between Stow, Caddon

Water, and Fountainhall, round to Tweedside, was visited by a sudden and extraordinarily violent fall of rain. The *partial manner* in which this thunder spate (for it was nothing else) fell out was most remarkable. In Luggate Water the rain began at half-past three, and fell in 'even down pour' till ten at night. At Stow about five o'clock the fall was equally severe and heavy, but did not last so long; while at Whitelaw, three miles further down the Gala, only fell a few drops. At Clovenford it was felt in great force, but was also of short duration; and at Galashiels, two miles south-east, there was a *sultry afternoon, without any rain*. Another remarkable fact is, that the barometer continued steady in Galashiels, while within a mile or two, north-west and east, the elemental discharge was falling in such unprecedented fury."—*Morning Journal*, 21st July, 1860. Now, it is evident the atmospheric column within which Galashiels was situated was not affected nor disturbed by the electric fluid which encircled it, for the barometer continued steady, and there was no rain, while all around, through the action of the lightning and thunder, the rain was heavy and severe. He who ruled the elements of old still holds them in his hand, directs their course, and gives them laws.

We have seen that the ascent of water vapour above the firmament, and its return thence by means of electric influence, as clearly taught in the sacred scriptures, is also found accordant with scientific observation. Rising continually from the earth and the sea, and passing into the high and gelid region of

the air in a volatilized state, it must needs continue there until condensed and sent back by a dissolving agency. Albeit, the theory which otherwise accounts for rain, and confines its source to the floating moisture of the lower sky and the region of the clouds, may be admitted as being in part accordant with the state of high latitudes, where rain falls frequently in small quantities and in drizzling and passing showers, and thus thick fogs, which are of the nature of water clouds, frequently distil rain; but where, after a continued drought and scorching heat of many months, sudden darkness veils the sky, the lightning goes forth and rain comes down in torrents, it is sufficiently evident that the floodgates of heaven have been opened as in times of old. These deluging and abundant rains far exceed in quantity the ordinary floating moisture of the sky, while the lightning and thunder by which they are accompanied sufficiently indicate the cause of their precipitation.

With respect to the general amount of rain, and the times and circumstances of its descent throughout the world, there is great diversity. Its general distribution depends much upon the force and direction of the wind—for rain, as well as clouds, is “carried about by winds,” often to a great distance. God, as it pleaseth him, “calleteth for the waters of the sea, and poureth them out upon the face of the earth.”

As to rain between the tropics, the year is divided into two seasons—the wet and the dry. There are entire months without a single cloud being seen in the sky. Near the equator there are two dry and two

rainy seasons, but as we recede from it the periodicity of rain disappears. Within the tropics, the greatest quantity of rain falls when the sun is at the zenith. North of the tropics, it rains most abundantly in winter; and while, in many countries, the night is almost always clear and serene, in others the reverse occurs. In some regions twice as much rain falls in summer as in winter: in others, as in the west of England, there are more rainy days in winter than in summer. With respect, however, to the quantity of rain throughout the world, our information is necessarily limited, and must be so, considering the diversity of climates, the varied action of the elements, and their dependence on the mysterious and mighty agency, "the lightning of rain," of which the going forth and operation is necessarily referable to the wise and righteous disposal of an ever-watchful Providence.

HAIL.

THE phenomenon of hail is not without its difficulties. "From the origin of Meteorology, a multitude of different explanations of this phenomenon have been given. How are we to understand that, during the fine season and the hottest days, considerable masses of ice fall? Why certain countries are ravaged by hail almost every year, while adjacent localities are almost entirely spared? Is hail formed at a great height in the atmosphere, or at a moderate distance from the surface of the earth? Such questions as these have been often raised, but never solved."—*Kaemtz*. In ancient times the wise men of the East, with all their observation of "the signs of heaven," could not fully understand aerial phenomena. Accordingly, the patriarch was thus interrogated:—"Hath the rain a father? or who hath begotten the drops of dew? Out of whose womb came the ice? and the hoary frost of heaven, who hath gendered it? The waters are hid as with a stone, and the face of the deep is frozen."—Job xxxviii. 28, 29, 30. Are we not hence to understand that the process by which water is changed into vapour, rain, dew, hail, hoar frost, and ice, pertains to the operation of God, and is effected by the diversified working of the aerial machine on whose mysterious but un-

erring movements in the hand of God this world and its inhabitants so entirely depend?

“True hail has generally the form of a pear, or of a mushroom, terminated by a roundish surface. It is an opaque mass, analogous to hardened snow. The large hailstones are surrounded by a thick coat of ice, and are composed of alternate layers of snow and ice. No observer has seen hailstones formed of transparent ice; all make mention of a snowy nucleus. The grains frequently resemble spherical pyramids, or pyramids with their faces terminated by a base that is a portion of a sphere. It is generally admitted that it hails only during the day, but more commonly about mid-day, or soon after, at the moment of the greatest diurnal heat. The numbers then diminish in a very regular manner.”—*Kaemtz*.

Hail falls on the summit of the Alps, far above the line of eternal snow. It is thence we are taught to expect it to descend; only among “the treasures of the snow” can its material be deposited. And there also are both the thermal power by which that material can be dissolved, and the cold by which it can be afterwards congealed.

In relation to the circumstances of the descent of hail, considerable diversity is manifest. “At Bressier, above the lake of Neuchatel, the vines are often beaten down with hail. In the village of Lignieres, which is 390 metres above, rain falls, whilst hail is ravaging the vineyards on the shores of the lake. During the summer, storms come out of the valley of Travers, and discharge themselves in the

form of rain in the elevated regions, and of hail in the lower countries. *De Saussure* hence concluded that sleet is formed in the highest regions of the atmosphere, and that it is transformed into hail during its fall." "These observations," says *Kaemtz*, "which would seem to establish a presumption that hail is formed or increases in the lower regions of the atmosphere are difficult of explanation." But does not the difficulty and the explanation lie in the diversified thermal action, at different elevations, of the electric fluid, "the voice of the Lord upon many waters," as it pleases the Supreme Power to employ it? Near the earth, solar influence increases. Now, as sleet and rain above become hail below, so again hail above is dissolved into rain below, of which the following instances are furnished by the same author: "*Balmat* experienced a shower of hail during the night that he passed on the summit of Mont Blanc; and *Paccard* found much hail beneath the snow with which the summit is covered." "*Walden* says that rains in the plains are hail or sleet in the mountains. Hence it is evident that on the temperature of the stratum through which a shower is descending, and not on its elevation, depends its condition as being that of hail or sleet or rain; whilst again this temperature is dependent on the thermal force of the electric fluid rather than on the elevation at which it acts."

Hail of the size of pigeons' eggs or hens' eggs has frequently fallen. It even varies from the size of a pea, or a frozen drop of rain, to the bulk of several

inches in circumference. "During a hail-storm, October, 1831, masses of the size of the fist fell at Constantinople." Trees have been broken, vines and cornfields destroyed and damaged by hail-storms. These are most frequent in the vicinity of high mountains. In the south of France, between the Alps and Pyrenees, the injury done annually to the vineyards and standing crops "is estimated at upwards of two millions of money."—*Cassell*. "On some occasions blocks of ice of enormous dimensions have fallen. For example, in 1719, there fell at Kremo, hailstones weighing not less than six pounds; and at Namur, in 1717, others weighing not less than eight pounds. Again, it is stated that in 1680, masses of ice fell in the Orkneys twelve inches thick. These, however, were far exceeded by a block which fell in Hungary; and another which fell at Seringapatam, in the reign of Tippoo Saib."—*Scoffern*.

Hail, like other meteors, must be formed in the air before it begins to fall. Its fall, however, as well as that of rain, has been ascribed to false causes. It has been attributed to "the mutual conflict of north and south winds." Was all the large and devastating hail, of which so many instances have been recorded, formed and carried in the van of two opposing atmospheric currents, and thus precipitated on the earth below; or was the vapour of the sky, as thus borne along, formed into masses of alternate layers of ice and snow, and enveloped in an icy coating? As well suppose that what is carried down the current of a river, or the things which float upon the tides of

the ocean are produced by the element that carries them. From the composition of hailstones, as consisting of alternate layers of ice and snow, with a nucleus of the one and a coating of the other, we must conceive of it as formed where its substance is deposited in a frozen state: it is acted on by a thermal dissolving influence, and again congealed by cold. In its passage downwards, it cannot be supposed to acquire its qualities of ice and snow—to assume a pea-shaped form and an icy envelopement.

The thermal and attractive force of electricity, and its varied distribution and diversified action, account for the change of the gelid vapour of the sky into water, and again into ice and snow. The substance of these, and the intense cold in which they are formed, exist only in a high region of the air “above the firmament,” and there, also, is observed the flash of that fiery element which dissolves the treasures of the snow, and is emphatically termed—“The lightning of rain.” In the formation of hail, as in other atmospheric processes, the action of electricity is very manifest. “Thunder storms frequently accompany heavy falls of hailstones.” A shepherd, on the Alps mountains, observed a black cloud suddenly coming from the east and depriving them of the sight of a neighbouring elevation. “Soon after,” he says, “several formidable claps of thunder re-echoed among the mountains, and we saw several hailstones fall. We descended rapidly about 300 metres before the clouds burst. We were surrounded with lightning and thunder, and inun-

dated with hail and rain. We took refuge under a rock. On coming out of our retreat, we perceived a second cloud, which soon burst over our heads with a terrible crash. Hail, mixed with rain, followed us for several hours."

In the Southern hemisphere, the same phenomena of lightning and hail are presented. The following description of a thunder storm, is given by Messrs Bennet & Tyerman, who were sent by the London Missionary Society to visit the various missionary stations. It occurred when doubling Cape Horn :—
"Last night has been one of horrors and deliverances beyond all that we have yet experienced. About one o'clock, Mr Bennet heard a tremendous explosion or crash, as though the ship had been violently disrupted or all her timbers compressed together by some inconceivable force ; a hideous glare of light at the same time bursting through the bull's eye above upon the darkness. A second time, the terrible light flashed like a momentary conflagration of all around, and a louder peal of thunder than before accompanied the blaze, followed by what seemed to be the sea itself rushing in cataracts between decks. This, however, proved to be a storm of hail, the stones of which was as large as pigeons' eggs, and severely smote the hands and the faces of those above, who were exposed to it. The mate said that the first great flash heated his face, the sulphurous flame appearing to run down his jacket-sleeve. The second peal was accompanied by a crimson blaze, which was instantly followed by the tempest of hail, pouring

like shot upon himself and his terrified comrades." "The Lord, however, so ordained it that not a mast was sprung; not a sail carried away or ripped; not a timber suffered damage; not a life was lost, nor limb injured of passenger or crew."

Now this "stormy wind and tempest," this strange commingling of heat and cold, of lightning and hail, is evidently not attributable to the action of the sun, the most steady and important influence exerted on the world, but to the versatile and mighty agency of the electric fluid, to which alone, as sent by God, and seen in the foregoing instances, the sacred oracles ascribe it. The formation of the vapour of the sky—"the waters above the firmament"—into hail, by the same agency which brings it down as rain and dew, strikingly unfold the manifold resources of creative wisdom. When the same element of water, by the varied action of the same agent, supplies the earth in diverse ways so suitable to its necessities and character, do we not see clearly, not the operation of an insensate and invariable law, but the manifold wisdom by which the world was at first created, and is still sustained and governed?

The play of the elements and the revolutions of the sky evermore present successive scenes of the utmost irregularity. Each differs from the other. In observing those changes, how difficult to understand, how impossible to admit the theory of one fixed persistent law governing the world, and all its tumultuous and restless elements! Is there one uniform law by which hail is at one time of the size

of a pea, and at another time as large or larger than the fist—one persistent law by which it descends either gently and singly, or heavily and thickly in a pelting desolating shower? Does hail thus become rain; and does rain, again, in coming down, change into hail by the very same process or the same law? Atmospheric phenomena and processes, as described in sacred writ, and ascertained by observation, are inexplicable, as, indeed they are inconceivable, if regarded as resulting solely from laws supposed impressed upon the world at the creation, but easily understood as effected by the fiat of an all-wise and omnipotent Preserver. The words of Elihu, in Job, show us how these things were then regarded by the wisest of mankind: “God thundereth marvellously with his voice; great things doeth he, which we cannot comprehend. For he saith to the snow, Be thou on the earth; likewise to the small rain, and to the great rain of his strength. He causeth it to come, whether for correction, or for his land, or for mercy. Hearken unto this, O Job: stand still, and consider the wondrous works of God.”—Chap. xxxvii.

In affirming that “the heavens do rule,” we may, no doubt, be asked, How doth God know? and is there knowledge in the Most High? Does God regulate the elements, and uphold and govern all things? If he who created all things does not still govern and sustain them, who then is adequate to this essential divine procedure? A furnace irregularly heated, or a bellows unequally employed, or an axe or a saw in the hand of man, could not act less

uniformly than we see is done continually by the atmospheric element. And can such diversity of timely action, as we expect only from an intelligent and free agent, be brought into the category of things regulated by blind, insensate, and persistent laws, which of necessity are the laws of things without life? The layers of ice and snow, of which hailstones consist, are at first a gelid vapour, which only heat can dissolve into rain or water. Heat having thus done its work, the water then descends into a lower stratum, wherein it is frozen and condensed. Can you trace this process in all its stages, or ascertain the law or laws by which it is effected, or the altitude at which it happens? And can you further show how hailstones, in all their diversity as to weight, quantity and violence, descend to the earth and devastate man's labours and subsistence in particular localities and not in others; as when God said by the prophet, "I caused it to rain upon one city, and caused it not to rain upon another?"

Philosophers weary themselves in vain, and muddle the brains of other people, when they try to bring all the changes, and every diversity of atmospheric operation, to the standard of fixed invariable law, impressed on things at their first creation, and thence proceeding onwards in a regular series—an unbroken chain of cause and effect, antecedents and consequents—so as entirely to exclude the hand of God, and ignore his wisdom, goodness, power, justice, in governing the world. With the shapes and motions of the clouds, the aspect of the sky, and the "signs

of heaven," men still, as of old, labour "for nought and in vain." "Thou art wearied in the multitude of thy counsels. Let now the astrologers," (viewers of the heavens,) "the stargazers, the monthly prognosticators stand up, and save thee from these things that shall come upon thee."—Isa. xlvii. 13. How beautifully does the same prophet show that as the sky, by the mandate of God, sends down its treasures to enrich the earth, so by the better blessings of His grace, the fruit of righteousness and praise is made to grow among mankind. "Drop down, ye heavens, from above, and let the skies pour down righteousness : let the earth open, and let them bring forth salvation, and let righteousness spring up together ; I the Lord have created it."—Isa. xlv. 8.

DEW.

DEW is an invaluable agent in the constitution of the world. It is second only to rain in rendering the earth salubrious and fruitful. It is, indeed, a supplemental rain, without which the irrigation of the earth would be incomplete and its productiveness inadequate. Elijah predicted a very grievous famine when he said to Ahab, "As the Lord God of Israel liveth, before whom I stand, there shall not be dew nor rain these years but according to my word." Dew does not, like rain, fall at all times, but only in clear and serene cold nights. It descends most copiously after a hot day in summer or in autumn.

As to the cause of dew, there have been different theories. "Some," as remarked by Kaemtz, "admitted that it was a very fine rain coming from the elevated regions of the atmosphere; whilst others were persuaded that it came out of the earth. *Wells's* opinion is, that dew is an effect of the fall of temperature in the strata of the air in contact with the soil. When the latter is heated during the day the vapours rise, and when towards evening the force of the ascending current begins to diminish, they fall again towards the earth." Accordingly it is affirmed, that "Dew cannot properly be said to fall: it is always formed on the material on which it is found,

and does not fall from the atmosphere." Now, this is altogether inadmissible. It supposes that vapour, having first ascended from the ground, falls down again as things are wont to do which, being thrown up into the air, descend again in due time.

The source or cause of dew is, we apprehend, most easily ascertained where it is most frequent and most abundant. The amount of it is admitted to depend on the quantity of vapour in the atmosphere. A heavy fall of dew is accordingly regarded as a prognostic of rain. There is less dew when the wind blows across the land than when it blows upon the water. Westerly winds, which blow across the Atlantic, are more full of vapour than easterly winds. "The most abundant dews are observed on coasts. The moister the air is, all other things being equal, the more considerable is the quantity of dew that falls in a given time."—*Kaemtz*.

In tropical and warm countries, where dew is most essential, it is most abundant. When rain fails, dew, like a friend in time of need, supplies its place. "In Palestine, from May to October the ground is parched and vegetation languishes, but then the refreshing dew of heaven descends in copious abundance." Maundrell says, "Our tents were as wet with the dew of Hermon as if it rained all night." In Egypt, when the heat is excessive, the dew is particularly serviceable. The trees, which would be otherwise not able to resist the heat, bear abundant fruit.

The Bible, as might naturally be expected, in describing the descent of dew, agrees exactly with the

descriptions of modern travellers, and residents in Syria. It speaks of "the dew that descendeth on the mountains of Zion." It promises to Israel that "the heavens shall drop down dew." By the knowledge of Jehovah, "the clouds drop down the dew." By Isaiah, He saith, "I will regard my dwelling (the land) as a cloud of dew in the heat of harvest." A resident there writes in reference to dew,—“Presently the moon set, and all was dark—even the stars were hidden by masses of dew-clouds which soon covered not only the sky, but the mountain tops, and filled up the valleys below; and I could see nothing but the few bushes among which we were seated, and which became perfectly wet and very fragrant as the dew rested on them.”—*Christian Treasury*, Jan. 1864. “When,” says Dr Thomson, “the early light began to reveal the character of the scene around me, the country from north to south was buried under a dense, low-lying fog, which left the many-shaped hill tops, peering above it like green islets in the bosom of a placid lake. Such fogs are common on the great plains along the coasts, as we shall see in the land of the Philistines. But did you observe that dew rolled off our tents this morning like rain? And now the early sunbeams ‘sow the earth with pearls and diamonds,’ as Milton’s muse describes those pendant drops that glitter and sparkle from every leaf in the forest and blade in the field.”—*The Land of The Book*, 491.

Dew, fog, rain, being of the same nature, and evidently given for the same beneficent end, their fall

is with reason attributed to the same cause. "The vapour of water—dew, white-frosts, fogs, clouds, rain and snow," *Kaemtz* remarks, "is always precipitated under the influence of the same causes, but under a different form." Now, water vapour, which as an invisible gas rises from the earth and the sea, ascends in that state through every degree of temperature to the upper regions of the sky, and there remains a needful treasury until, condensed and liquefied by electric influence, it descends in vesicles and drops of rain. It is not then by mere chilling, but chiefly through electric influence, the gelid vapour of the sky drops down upon the earth.

The theory of the precipitation of rain through cold has been extended to the fall of dew. Both have been attributed to the condensation of water vapour in the air by mere cooling. But if vapour, which rises regularly in the air in all climates and in all degrees of cold, in a gaseous state, is not brought down as rain through cooling, but chiefly by a very different kind of influence, why should it be supposed that the fall of dew is otherwise effected? The condensation of water vapour in the upper strata of the sky cannot be attributed to cooling. Its particles there, as well as lower down, being kept distant and separate by a reciprocal repellent tendency, can never approach mutually without the agency of some external force. That force electricity, and it alone, supplies. With respect to rain, we have shown that the vapour of the world, which ascends into the upper sky in a gaseous and rarified form, continues there

uncondensed and incapable of condensation until dissolved by thermal influence. To the same effective agency we require to trace the fall of the heavy, penetrating dew of Syria and Egypt. The vapour which constitutes both rain and dew, being of the same nature, must be supposed to be affected by the same influence, in order to its condensation and descent as either dew or rain.

Dew, like rain, hail, and fog, is accompanied by a great development of electricity. This manifests the relation of this active fluid to all these, and their dependence on its efficacy: whatever establishes the connection of rain and hail with electricity, sufficiently indicates the importance of its action in regard to fog and dew, and indeed to all watery precipitations.

"When," remarks *Kaemtz*, "rain or snow falls from the upper regions of the atmosphere, there is at the same time a production of a quantity of electricity more or less strong. Electricity is very strong when dew is deposited. The signs of electricity are also very marked during fog; all observers have acknowledged it. The electricity is stronger as the fogs are thicker." "In serene, cold nights, when dew falls, electricity is positive or active; and when the sky is clear and without clouds, a sensitive instrument in an open place almost always indicates positive electricity. But this positive electricity varies in intensity; passing clouds, puffs of wind modify it in a few seconds. It only becomes negative in the case when there are distant storms." Dew does not then

fall ; electric action is not then sufficiently strong for its formation and descent.

To electric or magnetic influence we ascribe the appearance of dew on some substances rather than on others. " All things else being equal, certain bodies are sooner covered with dew than others ; plants are more wetted than the earth, sand sooner than a trodden soil, chips sooner than a piece of wood, and glass sooner than metals. As to the two last, namely, glass and metals, the former obstructs the passage of electricity, which by the latter is conducted."—*Faraday*. And does not the formation of dew on some substances rather than on others, thus appear to be attributable to electric or magnetic attraction ; as also the difference between rain and dew in this respect, that while the former falls alike on all things, the latter does not so ?

In a clear, cold night, when electricity is positive or active in the lower strata of the atmosphere, as well as in the upper strata, when storms commence with lightning, cold, or the absence of strong solar influence may be a necessary condition, as elsewhere remarked, of strong electric action, and consequently of the fall of both rain and dew, without being otherwise the cause of either ; for if a clear, cold sky does not hinder the ascent of water vapour, it cannot surely be the cause of its descent. In the fall of rain or dew, cold may be a negative condition, electricity a positive and active agent. And the latter must be supposed such, seeing its presence is always powerfully manifested, as in the case of hail and rain. Were cold or a low

temperature the cause of dew, might it not fall in the day as well as in the night, especially in high latitudes, where the climate is both clear and cold?

To the force of gravitation, the molecules of water vapour, like all other substances, are in subjection. And neither in their ascent as vapour nor in their descent as rain is there any power in the air to move them in a horizontal or oblique direction, or turn them from their upward or their downward course. The drops of water on a glass or window consist of the surrounding moisture, the particles of which are attracted and condensed by magnetic influence. They could not, unless so attracted and combined, be brought together by a horizontal or a slanting motion. Hence the substances on which dew rests must be supposed to possess some power of attraction—some degree of magnetic influence not possessed by other substances.

It is, however, sufficiently evident that to the moisture of the air the inestimable blessing of the dew of heaven, no less than the rain and the snow, must be traced. In the hottest and driest seasons of the year, when the earth is parched and the herbage most exhausted, the dew of Tabor and Hermon, which could not then be supposed to be supplied by the dry and thirsty ground, continues to descend during the entire night, so as to penetrate men's tents and clothing, and soak the ground like a heavy shower of rain. And here we may be allowed to remark, we have in the phenomenon of dew an emblem

of a higher and more needful and enduring influence, which God in his great goodness sends down upon his heritage—the people whom he hath redeemed—“as the dew of Hermon that descendeth upon the mountains of Zion, there God commanded the blessing, life for evermore.” “My doctrine,” says Moses, “shall drop as the rain, my speech shall distil as the dew, as the showers upon the grass, because I will publish the name of the Lord.” And to returning Israel the Lord graciously saith, “I will heal their backsliding, I will love them freely; for mine anger is turned away from him. I will be as the dew unto Israel: he shall grow as the lily, and cast forth his roots like Lebanon.”

METEORIC STONES.

"THE treasures of the hail," which God has "reserved against the time of trouble, against the day of battle and war," have been supposed to include the substance of meteoric stones. Of these, the materials, as of the other meteors mentioned in the context, are stored in the atmosphere.—Job xxxviii. 22, 26. Such were the hail and fire sent down on the Egyptians. "The Lord sent thunder and hail, and the fire ran along the ground. And the hail smote throughout all the land of Egypt all that was in the field, both man and beast ; and the hail smote every herb of the field, and brake every tree of the field." Such, also, were the great stones from heaven which fell upon the Canaanites. "And it came to pass, as they fled before Israel, that the Lord cast down great stones from heaven upon them unto Azekah, and they died : they were more that died with hailstones than they whom the children of Israel slew with the sword."—Joshua x. 11. A similar visitation, in a dreadful form, is in reserve for the enemies of Israel in the latter days. "And I will plead against him with pestilence and with blood ; and I will rain upon him, and upon his bands, and upon the many people that are with him, an overflowing rain, and great hailstones, fire, and

brimstone.”—Ezekiel xxxviii. 22. The original word *abenim*, both here and in Joshua x. 11, signifies stones of any kind. And this view of them agrees with the nature and appearance of meteoric stones, which, as the instruments of God’s power, are ever ready, like the lightning, the rain, and the snow, to obey his sovereign mandate. Isaiah, by whom the same impious and bold invader (even Gog with his bands) is styled the Assyrian, describes his fall in like manner by the visitation of God—“With the flame of a devouring fire, with scattering, and tempest, and hailstones,” (chap. xxx. 31). This event will strike the world with awe, for all eyes will be directed towards it, and convince them “that verily there is a God that judgeth in the earth.” “Thus,” saith the Lord, “will I magnify myself, and sanctify myself; and I will be known in the eyes of many nations, and they shall know that I am the Lord.”—Ezekiel xxxviii. 23. Now, no natural event, or ærial phenomena, can more strikingly betoken the great power and terrible displeasure of the Judge of all the earth against the wicked; there are accordingly various allusions to it in the sacred scriptures—Psalm xviii. 12; Ezekiel xiii. 11; Rev. xvi. 21.

The annals of mankind, as well as sacred writ, record the fall of meteoric stones. Livy says that a shower of meteoric stones fell on the Alban mount, in the reign of Tullus Hostilius. And in Pliny’s Natural History, a large stone is said to have fallen near Egospotamos, in Thracia. Plutarch describes a fiery body or luminous globe, like a cloud of flame,

with an irregular motion, from which a large stone was precipitated in the Chersonesus. Of recent instances, the number is very great. M. Baudin mentions that when he and M. Carris were walking in the court of the Castle of Moomes, in the evening of the 24th of July, 1790, on looking up they observed a fire-ball of a larger apparent diameter than that of the moon, dragging a tail which seemed five or six times longer than the diameter of its body, and terminating in a point. Two or three minutes after they heard a dreadful explosion. A strong sulphurous odour was diffused in the atmosphere. Many stones fell. Some of them weighed eighteen or twenty pounds, and a few even fifty pounds, but the greater number only about half-a-quarter of a pound. The fragments of the meteor were found lying in an almost circular space of nearly two miles in diameter. To this Lord Brougham adds—"M. D'Arcet, son of the celebrated chemist of that name, mentions two additional circumstances of great importance, from his own observation. The stones when they fell upon the houses had not the sound of hard and compact substances, but of matter in a soft, half-melted state, and such of them as fell upon straws adhered to them, so as not to be easily separated. It is impossible to reconcile these facts with any other supposition than that of the stones having fallen from the air in a state of fusion." *

* The preceding instances are taken from the "Encyclopædia Britannica," and abridged; as are those which follow from Lord Brougham's contributions to the "Edinburgh Review," and from Dr Dick's "Celestial Scenery."

Similar accounts have still more recently been communicated.—“On the 18th of December, 1795, the weather being cloudy, a stone, weighing fifty-six pounds, fell near Wold Cottage, in Yorkshire. A loud noise was heard in the air as of great guns at sea, followed by a hissing sound. When the stone was extracted, it was warm, smoked, and smelt very strong of sulphur.”

The following description is contained in the *Transactions of the Royal Society*—“On the 19th of December, 1796, about eight o'clock in the evening, a very luminous meteor was observed in the heavens by the inhabitants of Benares, and the parts adjacent, in the form of a large ball of fire. It was accompanied with a loud noise resembling thunder, and a number of stones fell from it, about fourteen miles from the city of Benares. It was observed by several Europeans as well as natives, in different parts of the country. The inhabitants of a village, near which they had fallen, observed a very bright light proceeding as from the sky, accompanied with a loud clap of thunder, which was immediately followed by the noise of heavy bodies falling in the vicinity. The form of the more perfect stones appeared to be that of an irregular cube rounded off at the edges, but the angles were to be observed on the most of them.”

On the 26th of April, 1803, an extraordinary shower of stones happened at L'Aigle, in Normandy. At one o'clock, the sky being almost serene, a rolling noise like that of thunder was heard, and a fiery globe of uncommon splendour was seen, which moved

through the atmosphere with great rapidity. Some moments after there was heard at L'Aigle, and for thirty leagues round, in every direction, a violent explosion which lasted five or six minutes; after which was heard a dreadful rumbling, like the beating of a drum. In the whole district there was heard a hissing noise like that of a stone discharged from a sling, and a great many mineral masses, exactly similar to those distinguished by the name of meteoric stones, were seen to fall. The largest of these stones weighed seventeen pounds and a half. Their specific gravity was three and one-third or three and a half times heavier than water.—On the 23d November, 1810, three stones fell in the neighbourhood of Orleans. These stones were precipitated perpendicularly, and without the appearance of any light or ball of fire. One of them weighed twenty pounds, and made a hole in the ground in a perpendicular direction, driving up the earth to the height of eight or ten feet. It was taken out half an hour after, when it was still so hot that it could scarcely be held in the hand."

The writer perhaps feels the more interest in those statements, that he had himself, in an early period of life, witnessed the descent of a fiery meteor of this description. When in the fields with other juveniles, the attention of the party was suddenly directed eastward, by some startling commotion and report in the air at the distance of three or four miles; when presently a ball of fire, about the size of a man's head, issued from a dense cloud not far above the

earth, and advanced towards them in a sloping direction. After looking at it earnestly for a few moments, being no philosophers, they hastily betook themselves to a place of safety. But though the meteor was left to take its course, its sudden, bright appearance, its slanting motion towards them, and the noise with which it was accompanied, could never be forgotten.

On May 1, 1860, the people of south-east Ohio, and north-west Virginia, about fifteen minutes before one, were alarmed by a noise resembling the firing of heavy cannon, and the explosion of a steam-boiler. At New Concord, in Ohio, thirty meteoric stones, amounting, in collective weight, to about 700 lbs. were obtained. The largest weighed about 51 lbs. This meteor is described by Professor Andrews and others in the *American Journal of Science*.

Meteoric stones "have a peculiar and striking analogy with one another, and peculiar characters which belong to no other stones with which we are acquainted."—*Dick*. "The ærolites which have at different times fallen upon the earth in England, France and Italy, and the East Indies, are all precisely of the same nature, consisting of the same simple substances, arranged in similar compounds, nearly in the same proportions, and combined in the same manner so as to form heterogeneous aggregations, whose general resemblance to each other is complete. When dug up they are found enveloped in a crust different from the rest of their substance, and bearing evident marks of having undergone the

action of heat in contact with the air." There is a striking analogy between these stones, and the masses of meteoric iron found in different countries.

All accounts of those extraordinary meteors were long discredited, and even laughed at by philosophers. Their origin is still a puzzle, and various theories have been propounded to explain it. The sacred writers, in narrating their appearance and descent, sufficiently indicate their formation in the air. There, we know, abundance of earthly substances exist in a dissipated form, to account for their origin, as well as for that of snow and rain, by the action of electricity. Indeed, all these are placed in the book of Job in the same category as the doing of the Lord, and equally pertaining to His providence.—Chap. xxxviii. 22-27.—To Job God was pleased to say, "Hast thou entered into the treasures of the snow; or hast thou seen the treasures of the hail, which I have reserved against the time of trouble, against the day of battle and war? By what way is the light (lightning) parted, which scattereth the east wind upon the earth?"* Who hath divided a watercourse for the overflowing of waters, or a way for the lightning of thunder; to cause it to

* In rendering the 24th verse, *Stocke* and others, for light use lightning—and *Bishop Hall* says, "Dost thou know how the lightning breaks forth from the clouds?" When the people saw a cloud rise out of the west, straightway they said, "There cometh a shower; and so it was."—*Luke* xii. 54. There of course the lightning was seen—"The Lord makes bright clouds (lightnings), and gives them showers of rain."—*Zechariah* x. 1. The east wind, which is often terrible, as to the prophet of Nineveh, is thus driven back and scattered by the lightning and tempest arising in the west.

rain on the earth, where no man is ; on the wilderness, wherein there is no man ; to satisfy the desolate and waste ground ; and to cause the bud of the tender herb to spring forth ?”

Now, since men of science have been compelled to admit the fact of the actual descent of meteoric stones, we doubt not they will also, in due time, readily acknowledge the truth of their ærial formation, as most accordant with the law of nature, and the constitution of the world. In the meantime, however, there is no general agreement as to their origin. “Perceiving no probability of having derived it either in the earth, or in the atmosphere, Dr Hutton, La Place and others, conjectured that they were projected from the moon. But from a consideration of the difficulties attending this hypothesis, La Place was afterwards induced to change his opinion.” Lord Brougham, who favours the idea of their lunar origin, at the same time shows this hypothesis to be liable to very grave objections. Indeed, its utter fallacy seems to us evident. Where is the proof that all known ærolites, with their vitreous coating and luminous envelopement, were projected from a body so distant as the moon ? Their composition is totally different from volcanic productions. Besides, productions of the moon, or any other planet, would, as Dr Dick remarks, be expected to exhibit several varieties of aspect and composition, and not the precise number of ingredients which are always found in meteoric stones. Now, however, the consideration of this sameness, which plainly carries

great weight, goes far to invalidate the doctor's own hypothesis. "Supposing," he observes, "that the bursting of a large planet was the origin of the small planets, Vesta, Juno, Ceres, Pallas, we may have a source whence meteoric stones probably originated. A number of small fragments being thrown beyond the attraction of the greater fragments, might fall towards the earth—revolve round that body at different distances, and being struck with the electric fluid, be precipitated upon the earth, and exhibit all those phenomena which usually accompany the descent of meteoric stones." "This hypothesis," it is added, "though not unattended with difficulties, is perhaps the most plausible which has been found."

But the difficulties of this hypothesis, which are not fewer than those of their lunar origin, are not of easy solution. If they revolve round the earth, beyond the utmost limits of the atmosphere, how does the electric fluid find them there, or why, while falling sheer down, should they be invariably struck by this fluid, as other bodies are not, and so be highly ignited, and be collected and borne along in a luminous envelopment? And that such fragments, weighing from two ounces to two hundred or three hundred pounds, should for thousands of years have revolved like planets in their orbits, is surely a groundless conjecture. And if mere fragments broken off from a large body, why is each as being in itself complete, of a regular form, and enclosed in a coating unlike the rest of their substance? This is altogether different from the very varied forms of the

fragments of all other bodies. And when we look at the works of God—"In wisdom he has made them all,"—Psalm civ. 24)—it seems hard to affirm that he formed any planet so loosely that it must need burst asunder, like a bomb-shell, into countless fragments.

It cannot be doubted that there are elements floating in the air sufficient to form meteoric stones by the action of electricity. There is much impurity mingled with the atmosphere. Diverse substances are carried upwards in a dissipated state. "A great number of metals rise into the atmosphere in a gaseous state. There arise annually from the metallurgical forges of Clansthal more than ten millions of kilogrammes of vapours, composed of water, lead, iron, zinc, sulphur, antimony and arsenic."—*Kaemtz*.

Why meteoric stones should be found in the lower strata of the air, whence they usually issue, is obvious from the fact of the great impurity existing in it near the earth. Professor Smyth, who went to Teneriffe under the auspices of the Admiralty, found the atmosphere at Santa Cruz so loaded with thick dense clouds, that he almost immediately abandoned that station. To rise above the impure air with which the whole country seemed to be covered, into one that was clear and transparent, the astronomer and his party began to ascend the long slope above Ortova, and where at the elevation of 5000 feet he passed through the screen of dense vapour into a pure medium, and had for the first time since his arrival

in the island a dark blue, cloudless sky overhead. Yet even there they were sometimes enveloped in a dusky, smoky sort of medium, whose vast strata fields, one on the other, and stretching out to the distant horizon, rose some thousand feet above their heads. Sulphurous vapour floated round the peak. They afterwards ascended to an elevation of 10,900 feet, where, in an uncontaminated atmosphere, they erected their instrument."

The sky above the region of the clouds and the snow line being clear and of an azure colour, we may infer from both its transparency and lightness that heavy earthly particles do not rise so high, and cannot therefore accumulate at that high elevation. Mere luminous bodies, such as shooting stars, being light and combustible, originate, blaze forth, and expire at a high altitude. These are seen in clear, serene nights and at particular seasons, and cannot therefore be classed, any more than the *ignis fatuus*, or the will o' the wisp, with meteoric stones. The grosser and heavier elements of these meteors accumulate only in the lower strata of the sky, where they are affected by "the lightning of thunder." Shooting stars, then, differ from aerolites. "Their altitude and velocity are greater; they are more numerous and frequent, and are unaccompanied by any sound or explosion. Their brilliancy is also much inferior, and no portion of their substance is ever known to have reached the earth."—*Cassells*. Meteors which could not exist in vacuum, or in "the empty place" above the sky, having been seen at an altitude of 100

miles, it is hence inferred that the atmosphere is of this height.

The loud noises which attend the appearance and progress of aerolites, afford no small indication of their origin. As these noises are different at different stages of their progress, so are their causes. A loud, detonating noise, which has been compared to thunder and the firing of artillery, was heard at the time of the explosion of the fiery globes in which they were enclosed. Afterwards a different or hissing noise, like that made by cannon balls or other missiles, attends their passage through the air and their falling to the earth. It was not without reason that the royal historian, the Emperor Tchangize, in the memoirs of his own reign, called the mass which fell in the Punjaub "the iron of lightning." Indeed, when we consider the various and extraordinary power and action of the electric fluid, we cannot but refer to it the formation of meteoric stones, of which the materials are treasured in the sky. There, without a miracle, they are produced, as God pleases, by "the causes which operate in the production of rain, thunder, tempests, and tornadoes;" all which phenomena, as before remarked, are placed in the same category in the book of Job. And in manifest accordance with the doctrines of that ancient record, many scientific men have ascribed the phenomenon of meteoric stones to atmospheric causes. Some "philosophers," as remarked by Kaemtze, "have admitted that they were a product of our atmosphere." This hypothesis "has been sustained by *Egen, G.*

Fischer, and *Ideler*. The former especially has put forth several important considerations in favour of this opinion." In our own country the same theory has been adopted,—“That these stony masses have all the same appearance and contexture, as well as internally the same nature and composition, are circumstances that strongly point out an identity of origin.” “We may also remark that the soft and incoherent state of several of the recent specimens but ill accord with their supposed passage through any considerable body of space, and evidently suggests the notion of instantaneous formation in the atmosphere.” “If a solid result from the combination of two aeriform substances,—if oxygen, the properties of which are familiar to us, in the state of gas, can undergo fixation, and if fluids can pass into crystalline forms, is it too bold to presume that similar processes are effected in the grand laboratory of the atmosphere?”—*Ency. Brit.*

Lord Brougham calls this “a clumsy and gratuitous explication.” Nevertheless, he admits that these bodies may, for aught we know, be composed of oxygen and azote, or hydrogen, &c., but adds, “as yet we have no reason to think so.” If, however, the constituent parts of meteoric stones exist in the atmosphere, and are there compounded by the force of electricity, are they, any more than other compounds, to be accounted “an actual creation” or “a miracle?” Science must admit the existence of many combinations without being able to furnish any explanation of the process by which such combinations are effected.

Lord Brougham, though preferring the notion of a lunar origin, candidly admits, "It does not seem easy to conceive how their passage through so rare a fluid as the atmosphere could have generated any great degree of heat, with whatever rapidity they may have moved."

But this great degree of heat, which evidently operates in their formation, must be regarded as explanatory not only of their ignition, but also of their black and vitreous coating, their round, conic, and triangular shapes, their luminous and globular envelopment, and the loud noises, like thunder, which accompany their fall. As to such as are said to have fallen perpendicularly, any difference in relation to their first appearance and the manner of their descent may, perhaps, be referred to the altitude of the stratum in which they were produced,—one of these, taken up half an hour after its fall, having been still so hot that it could not be held in the hand, thereby affording evidence, like other meteorolites, of having undergone the action of heat in contact with the air.

Of the cold of the space beyond the atmosphere, Sir John Herschel says : "An intense cold exists in empty space—a degree of cold which, from several different and quite independent lines of inquiry, we are sure is not less than 230 degrees of Fahrenheit's thermometer below zero. No animal or vegetable could resist such a frost for an hour, any more than it could live for an hour in boiling water." On the subject of inquiry the opinion of this eminent philosopher is thus expressed : "The analysis of meteorolites, which, there

can be no doubt, *have come to the earth from very remote regions of the planetary spaces*, has, up to the present time, exhibited no new chemical element."—*Good Words*, p. 279, 1863. Now that space may well, at least comparatively, be counted empty, in which a comet, which he pronounces "a mere puff of vapour, or something as unsubstantial," moves with immense velocity, unimpeded and unbroken. Would meteoric stones, especially small ones, retain an intense heat in their long passage through such excessive cold, and again lose it speedily in falling to the earth? They must, we are satisfied, have acquired their high temperature, as well as their vitreous envelopement, in contact with the air by the action of that fiery element which not only penetrates, but also heats, with inconceivable intensity.

If blocks of ice of many inches thick, and masses of hundreds of pounds in weight, have fallen from the sky, after being formed there of water vapour by the strong attractive force of electricity, why should not stones of equal size be formed by the same agency of the grosser and metallic atoms which are known to be carried up and diffused in the atmosphere?

Philosophers having generally been long unwilling to believe what both authentic history and sacred writ record of the descent of meteoric stones, they may be equally reluctant to admit the inspired account of their production in the air by the action of electricity. But while obliged to have recourse to very baseless theories, which, albeit, some of them ignore, "do they not thus acknowledge that they are com-

pelled to imagine a set of causes, without any other foundation in their belief in them than their occasion for their assistance in explaining the phenomenon?"

It is certainly idle to account for the production of aerolites by hypotheses which the laws of evidence do not sustain. 'The fact, however, we may here remark, of their occasional, irregular, and uncertain occurrence, cannot, any more than that of other irregular and unequal physical phenomena, be reconciled to the philosophy, which setting all truth and reason at defiance, would trace all the ever-changing and variable occurrences of nature, however fitful and unequal, to invariable and unbending law; for by such law, change, variety, and adaptation, are a natural impossibility.

ELECTRICITY.

THE acknowledged influence of electricity in the general phenomena of nature, and its manifest agency in the regulation of the seasons and the weather, are a sufficient reason for a special consideration of its place and importance in the government of God. Of the nature of electricity two views are entertained —“some conceiving that electrical phenomena are the result of a certain condition or state of matter ; others, that they are occasioned by a peculiar form or kind of matter.” So remarkable a difference of opinion, on so important a subject, among our wisest men, commends to our attention the definite and clear information of the word of God. Presuming the latter view to be the correct one, we believe “Electricity is to be conceived of as a highly attenuated and impalpable substance, which, in ordinary bodies is latent, and as it were buried in them, but when they exhibit electrical phenomena, becomes sensible, and like some infinitely light elastic fluid, envelops them, or flows over them, or through them. This electricity is invisible, but gives rise to phenomena cognisable to all the senses.”—*Dr Wilson.*

Electricity exhibits a remarkable duality of nature and action, and it has accordingly been supposed to consist of two kinds, termed *vitreous*, and *resinous*,

or *positive* and *negative*. But this distinction, which is explained in treatises on the subject, is more interesting to the scientific than the biblical inquirer, who regards the powers of creation chiefly as they are developed in the world's administration. Doubtless, however, this duality, or twofold nature and action of the electric fluid, contributes greatly to its power and efficiency, and perhaps not less to the difficulty of tracing and unfolding its mysterious working and career.

This extraordinary, incomprehensible fluid, which is universally diffused and attached to all bodies, may be compared to latent solar heat. Were a large amount of solar heat suddenly evolved, and visibly sent forth, would this be more wonderful than the sudden evolution of the electric fluid, and its subsequent action in lightning and thunder? United to all substances in the earth, the sea, and the air, and acting on all animal and vegetable life, it must also, in like manner, essentially affect the seasons and the climates of the world.

That it is a distinct, powerful, and independent substance, and not a mere quality of matter, is, we presume, made evident by its manifest effects. When it suddenly comes down, and passes, like a bolt of fire, through the side of a strong ship, leaving a way open for the water of the sea to enter; when in the field it burns up sheaves of corn, which lay wet and saturated, after a drenching rain; when it blazes in the sky, and sends forth its voice in thunder; and, as in the eastern world, it pours down cataracts of

flame, turning night into day, rending rocks asunder, and shattering the cedar and the oak—does it not, in appearance at least, seem to demonstrate its separate existence, as well as its extraordinary force?

Electricity is regarded as a dominant and vital power, not only in our world, but in other globes also; it is even thought to pervade the universe. The heavenly bodies are, accordingly, supposed to be magnetic; the sun and the moon are accounted magnets. Of the power and supremacy of this widely diffused element it has been well said: "Electricity and magnetism steadily approach to the rank of demigods; the dark lowering gloom of the thunder-cloud, the overwhelming burst of the explosion, the flash from which the steadiest eye shrinks, and the irresistible arrow of the lightning, which no earthly substance can withstand, speak of something fearful, independently of the personal danger which they may whisper. They convey, far more than other appearances do, the idea of superior, mighty power, manifesting displeasure and threatening punishment."—*Whewell*.

Who does not perceive the truth and force of this description? And ought we not, moreover, to be sincerely glad when the language of our eminent and esteemed philosophers is accordant with the utterances of the sacred scriptures? "The voice of the Lord is upon the waters: the God of glory thundereth: the Lord is upon many waters. The voice of the Lord is powerful; the voice of the Lord is full of

majesty. The voice of the Lord breaketh the cedars; yea, the Lord breaketh the cedars of Lebanon. He maketh them also to skip like a calf; Lebanon and Sirion like a young unicorn. The voice of the Lord divideth the flames of fire. The voice of the Lord shaketh the wilderness; the voice of the Lord shaketh the wilderness of Kadesh. The voice of the Lord maketh the hinds to calve, and discovereth the forests: and in his temple doth every one speak of his glory. The Lord sitteth upon the flood; yea, the Lord sitteth King for ever."—Psa. xxix.

It is in perfect accordance with the idea of God's sending forth the lightning, that the accompanying thunder is called the voice of God. The most civilised heathen nations held this notion, and gave their supreme divinity the title of *Tonans*—the thunderer. In the book of Psalms we read, "The Lord also thundered in the heavens, and the Highest gave his voice; hailstones and coals of fire."—Psalm xviii. 13, and Exodus ix. 23. And is not thunder eminently the voice of God in the world of nature? Neither the sound of "deep calling unto deep," at the noise of falling cataracts, nor "the fulness of the sea when it breaks upon the shore," can be compared to the voice of thunder—as attended by the lightning's glare and flash, and torrents of deluging rain. The voice of the Lord, which is "full of majesty," never fails to affect the hearts of men with awe, and to produce an irresistible conviction of the mighty power that rules on high. "They also that dwell in the uttermost parts are afraid at thy tokens:

thou makest the outgoings of the morning and evening to rejoice."—Psalm lxxv. 8.

It is a primary consideration whether electricity is sent forth and regulated by a physical insensate law—some unknown external force or influence, or by the fiat of God, to which the Psalmist traces its entire progression, and all its mighty doings. Though a great and controlling agent, it does nothing, and indeed can do nothing, of itself. Like all inanimate things, it is inert and powerless, and less like the living than the dead. Until called and sent, it utters no sound, diffuses no light, acts on no substance, and carries no tidings; but evoked and conducted, what wonders does it effect! But if God by his own power, or by the hand of his living messengers, does not send it forth and guide it, by whom is it employed, or who instructs it what to do, and whither to proceed? The information of scripture is authoritative and distinct. Can science furnish any other information that can satisfy a thinking mind, or answer such questions as were designed to convince the patriarch of his own imbecility and ignorance. "Canst thou lift up thy voice to the clouds, that abundance of waters may cover thee? Canst thou send lightnings, that they may go, and say unto thee, Here we are?"—Job xxxviii. 34, 35. Whatever electricity may be supposed to be, it remains balanced and quiescent until excited and sent forth. But so soon as brought into action, "results are produced in an instant immeasurable by time; they include a light of the intensity of the

sun in his strength—a heat capable of fusing the compactest metals—a force in a moment paralyzing the muscles of the most powerful animals—a power suspending the all pervading gravity of the earth—and an energy capable of decomposing and recomposing the closest affinities of the most intimate combinations. It seems to be the only agency exerting such influence on matter, organic or inorganic; while its development, under the simplest action, is a mystery unfathomable by the acutest human intelligence.”—*Electricity, by the Rev. Edwin Sidney.*

The firmament of heaven was constructed to be not only a depository, but also a conductor of the electric fluid, so that the lightning might “shine from one part of heaven, even to the other.” Hence a path by which it should be sent was indispensable. And seeing it behoves man, when sending it to prepare a way in accordance with its nature, must we not infer that a path is required where its field of enterprise is the world, and the end to be accomplished is the service of mankind? The torpedo’s perfect and complicated apparatus, no less than the telegraph and the voltaic pile, strikingly unfold its character as designed to be subservient to the rule of intelligence. How indeed could it be sent, or at all made to serve a specific end, except the sender should find a way, and determine the purpose which it should accomplish. In the use of this fiery element by a creature of a low order, it is very evident, that in addition to the fluid, and an apparatus for applying

it, the power of a living nature, a presiding will, is essential. Without this, both the electric force and the admirable battery through which it is discharged, would be of no avail. And thus it pleased the beneficent Creator to make it manifest, that the principles and power by which the earth is governed, also rule in the firmament of heaven.

"The forces of electricity are in action, probably in all living organisms, but certainly in the muscular systems of the higher animals. In a very few (so far as yet known, in only a very few animals among the millions which exist, and these all belonging to the order of fishes,) the electrical action has been so stored as to render it serviceable as a weapon of offence. Creatures which grovel at the bottom of the sea, or in the slime of rivers, have been gifted with the astonishing faculty of wielding the most subtle of all the powers of nature AT THEIR WILL. They have the faculty of "shooting out lightning" against their enemies or their prey. But this gift has not been given without an exact fulfilment of all the laws which govern electricity, and which especially govern its concentration and destructive force. The electric ray, or torpedo, has been provided with a battery closely resembling, but greatly exceeding in the beauty and compactness of its structure, the batteries whereby man has now learnt to make the laws of electricity subservient to *his will*. There are no less than 940 hexagonal columns in this battery, like those of a bee's comb, and each of these is subdivided by a series of horizontal plates, which

appear to be analogous to the plates of the voltaic pile."—*Duke of Argyll, in Good Words*, Jan., 1865.

Now, certainly, for an agency so docile and passive to come forth from its latent and inactive state to execute the pleasure of the Ruler of the world, and afterwards, when its achievements are accomplished, to return to its former condition of quiescence and obscurity, is a most remarkable display of Divine interposul. And is it reason to attribute this admirable administrative power to physical insensate laws—laws neither conceivable, nor known by any man? What are we the wiser for being told, "The electric tension of the atmosphere is continually undergoing great disturbances?" It is not, however, by perturbations and disturbances of any kind, but by intelligence and order the universe is governed, and the lightning sent forth.

It is, indeed, singularly characteristic of this powerful and active element to know, so to speak, how to be directed and controlled, and to require accordingly to be called forth and sent. The torrent rushes downwards, and the hail and the rain descend by the force of gravitation. This process is uniform, and the reason is obvious. But who sends the lightning of heaven? Is there any power but that of a living agent by which it is known to be governed? And whoever uses it, whether man, or angels, or creatures of a lower grade, may be supposed to say, in the words of Faraday, "We have it under perfect command—can evoke, direct, employ it."

Now, does this eminent electrician violate the laws

of nature? Does he not in truth fulfil them? Does he not demonstrate that the paramount and vital forces of creation are subsidiary to the power of intelligence? If they were not so constituted, how could they be so readily employed by more than one description of living agency? While men wonder whether electricity "issues from the sky or from the Cimmerian caverns of the earth," what right have they to deny its subjection to the rule of living power? Can that be too hard for angelic wisdom to accomplish which is done not only by the reason of mankind, but by the instinct of the lower animals? Seeing, then, that God evokes the latent fire of electricity to execute his pleasure in the world, and has also given to the sons of men, created after his image, successfully to employ it, why should we deny this power to the ministering spirits, who far surpass ourselves in intelligence and strength? Fire cannot apply itself, and electricity does nothing, but continues in abeyance until called and sent into the field of action and victory.

The attention of mankind is now much directed to this extraordinary agent. They find, as the word of God clearly shows, it does not go unsent. And while it is the greatest and most effective of sub-lunary forces, it is also the most obedient and tractable. It obeys the higher law of mind. God has stamped upon it the twofold character of the highest potency and the most entire subserviency. He has given power to employ it to more than one order of living agents. "So far," remarks a celebrated

writer, "as the ordinary purposes of civilised life are concerned, electricity does nothing till we have taught it how to serve us; then it runs swifter races for human convenience than ever were run before. When the mind takes hold of it, electricity becomes a patient drudge, so that we now work by lightning, which would never have done a single thing for us if it had not been harnessed by the human mind. But now, above the sea and under the sea, it carries the messages of nations, flashing from east to west, proclaiming war and heralding peace, and performing the great offices of civilisation. When man takes hold of it by the head, and says, Receive my bridle; and throws over it the saddle, and says, Take me for your rider, it becomes patient and submissive, and acknowledges man as his master."—*Rev. H. W. Beecher.*

Who, then, sends the lightnings that they may go? and to whom do they say "Here we are?" Is it not to God, whose voice is upon many waters—whose "lightnings lightened the world?" Both scripture and science show the subserviency of this potent agency to the higher power of mind. Though mighty as a giant, it is docile as a child. Like the greatest in the kingdom of heaven, it is also the most facile and lowly. No service is too mean for it, no labour too difficult, no enterprise too vast. Among the powers of this world, it is "the chief of the ways of God." It is nevertheless dependent and subsidiary. In order to work, it must be commanded; in order to go, it must be sent, and its way prepared.

When, indeed, is it ever known to act for a definite purpose without the guidance of intelligence ?

While the agency of angels and of men, and even of living creatures of a lower grade, is recognized as an efficient cause of electric action, any other cause is confessed to be unknown. "In the sciences which treat of electricity, magnetism, and galvanism, the object sought is the discovery of laws of phenomena—an order which the phenomena follow—rules which they obey,—*the causes by which they are produced are still unknown and disputed.* Are we to ascribe them to the operation of a fluid or fluids ? and if so, in what manner, the facts of heat, magnetism, and electricity, and galvanism ? In these and other cases we have extensive departments of science, but we are as yet unable to trace the effect to the cause, and our science, so far as it is positive and certain, consists entirely of laws of phenomena."—*M'Cosk.* This we deem is but poor satisfaction ; for even laws, order, and modes of operation are very imperfectly and partially understood,—of electricity, in particular, it is remarked, that while "exerting such influences on matter, organic and inorganic, its development under the simplest action is a mystery unfathomable by the acutest intelligence." By the ancients it was counted a felicity to be able, "*cognoscere causas,*" to trace effects to causes. Only thus can instrumental or second causes be known, and the Great First Cause duly recognised and honoured. Such, however, being now the state of science, and its reluctant confession of utter inability to scan the works of God, or com-

prehend how the world is governed, shall we not the more gladly listen to the voice of revelation, which tells us clearly and repeatedly, that when the lightning "shineth out of one part of heaven to another" it is sent by God; and that chiefly by its action are the weather and the seasons affected? On this subject the Bible is in advance of science. Job was before Thales: the man of Uz far excelled the Milesian. He expressly refers electric action and procession not to "a fluid or fluids," but to the fiat of God. And it certainly much more concerns us to know the *cause*, than the order and manner of its procession. And many now well know the fact and the cause of the conveyance of information by the telegraph, who know nothing of the process or manner of it: they are, indeed, much more interested in the benefits than in the mode of its conveyance. In truth, the world is so constituted, and we ourselves also, that causes of phenomena are evident, while the laws or mode of operation are unknown: the *why*, or *what*, is better understood than the *how*. Look at the products of which instinct is the cause. Can you describe the process or the laws of making honey, or of producing silk? Simple people know the causes and effects, not the process of incubation; and even wise men are more taken up with the qualities and causes of things, than with their order, or the manner of their production. With some, however, law or manner is the main question: the *how*, not the *why*. "*How* opened he thine eyes?" said they to the man that had been born blind. In what manner was the operation

performed? They could not perceive or appreciate the extraordinary nature of the good deed done to him, but would idly pry into the manner of it. Were they capable of understanding it, or could it indeed be explained? How was the world created? and how are the dead raised up? While agents, and actions, and results are undeniable, fools trouble themselves about a mystic process which lies deep hid from the eyes of all living. Who can conceive or tell how God created all things, or how indeed any thing could be created? How he created the electric fluid you know not, and how he makes it move continually in ten thousand currents, you cannot understand. Both its nature and the modes of its development are still beyond the reach of the human mind.

When man evokes this extraordinary messenger, he requires to prepare a way, and it no less needs a way in both the air above and in the earth below. "God understandeth the way thereof, and he knoweth the place thereof; for he looketh to the ends of the earth."—Job xxviii. How could it go in order to precipitate rain, or snow, and hail, and dew, upon the earth, any more than run as the herald of mankind with the news of the day, without a sender and a way? Inertia is a property of matter, and electricity being a thing without life, it is of necessity inert and passive, and can neither move nor act till moved and acted on. As soon would a solid rock or a bar of iron fly, *sua sponte*, in the midst of heaven, as the lightning go without being sent. This formidable agent, how strong and terrible soever, in his going forth neither

wakes from his slumbers nor at all leaves his place until he has received his "marching orders."

That electricity was designed to be subservient to the power of intelligence is manifest from its otherwise unaccountable irregularity. Physical law is fixed, regular, and constant; but mind and will are free. And what thing soever the living mind employs proceeds and acts as the mind determines, whether regular or irregular. There is accordingly no greater disturber of the world's equilibrium on the one hand, nor a surer regulator of its phenomena on the other, than this powerful and subtile element. Tempests, hurricanes, tornadoes, irregular and desolating winds, violent and sudden changes, are with reason referred to its varied action. Of this surprising diversity of action it has been well said: "How marvellous it seems that the identical agency which, under other circumstances, creates the storm and covers the ocean with the tempest cloud, should, in the case of the silent needle in the compass, form the guide of the mariner to the haven where he is going, and give him in the darkest night a cheering indication that his path in the deep is sure!"—*Sidney*.

And thus the volitions of the mind are alone capable of exhibiting variety and adaptation. *Comte* indeed says, too truly, "Will is capricious." But will, when influenced by wisdom and benevolence, is eminently orderly and steadfast. "A wise man observeth both time and judgment." How much more doth "the only wise God," who, having "made everything beautiful in his season," administers "with never-

failing skill " all the forces and phenomena of the heavens and the earth. This is so abundantly evident in the economy of nature as to have kept alive the belief in all the world of a supreme and overruling power, together with a sense of man's dependence and responsibility.

The government of this mighty vital agency, in all its diversified operations, by a uniform and fixed law, would, without doubt, be an invincible enigma. And it has with reason been confessed that " the doctrine of physical interposition, if taught in the sacred scriptures, would undoubtedly be sufficient to overbear the evidence from induction of the uniform operation of natural laws, in the same way as the evidence is overborne by the testimony in the case of miracles."—*N. A. Review*. Now, certainly, if any supposed evidence can at all be overborne, even by miracles, it is weak and fallacious, and no evidence at all, but an assumed hypothesis. Where is the evidence of the supreme dominion of material forces independently of mind ? Philosophy has not found out one fact, or framed one argument of any plausibility or force to confront with the scripture doctrine of creative wisdom, and an active overruling providence. The motive power of the elements is on all sides open to investigation—not less than the motive power of intelligence, which resides not in bones and muscles, but in the paramount volitions of the living mind.

The burden of proof, it has been said, lies on those who assert divine interposition. Well, be it so ; they do not feel the burden heavy, and they are sure

that a very heavy burden lies on such as deny it. Hence their pitiful and gratuitous hypothesis of a uniform predominant and persistent (albeit, undiscovered and utterly unknown) law, ruling all mind and all the infinitely varied phenomena of this changeful world. Not only is this vain philosophy confessedly contradictory to the oracles of God, but in manifest antagonism also to true science and the reason of mankind.

SOLAR AND ELECTRIC INFLUENCE.

"WE are not," says Dr Faraday, "to suppose that there are very many different powers by which the phenomena of nature are governed." This is an important fact which, if kept in mind, might preserve us from distraction, and direct our inquiries to objects of primary consideration. The two great ruling powers of the world are the Sun, and Electricity. By these chiefly, we might almost say exclusively, are the climates and the weather of the world regulated, and the means of national prosperity supplied. But while both powers harmoniously work together, they are in their operation manifestly different, and even, in a sense, antagonistic; counteracting and balancing one another mutually, like light and darkness, cold and heat; and, as it is said of other opposites, "God hath set the one against the other." No two powers, indeed, can be more dissimilar than the sun and electricity—the one a vast and shining orb, which ceases not to pour forth an immeasurable flood of vital influence; the other a subtile, latent fluid, which, like the soul in the body, no eye can see. Yet it is ever present in the air, in the earth, and in the ocean, to counteract and modify the action of the sun, and to adapt the varied vital evolutions of that luminary to the varying conditions of mankind.

That there is at least an apparent antagonism between solar and electric forces, is, we presume, unquestionable. When the one is most active the other is least so. The electricity of the air increases in strength with the altitude, and solar influence diminishes. "Experiment shows us that positive electricity becomes stronger as we rise higher in the atmosphere." And in proportion as you ascend, the sun is least powerful, and the cold most intense. Further, there is more electricity at night than in the day time, and more in winter than in summer. And at full moon, when the solar influence is augmented by the increased reflexion of the sun's light, there are then few rainy days. "The effect of the warmth—radiated from the moon's highly heated surface—is to clear the sky of clouds, and to produce not only a serene but a *calm* night."—*Herschel*. As the solar action is most powerful at that time, "the lightning for rain" is least effective.

To November meteors, and shooting stars, is assigned a very high altitude. These splendid meteors, which are of electric origin, have their birthplace in the very cold and frozen strata of the sky. The aurora borealis and australes—which are also remarkable electric phenomena—become less brilliant as they recede from the intense cold of the polar regions. Thus, when solar influence is least effective, those splendid meteors are most powerful and dazzling; as if to solar and electric agencies not only different but antagonistic power had been given.

It is moreover a remarkable fact that "aurora, or northern lights, have been ascertained to be much more frequent in the years when the spots of the sun are abundant, and extremely rare in those years when the sun is free from spots. And magnetic storms also, which invariably accompany great displays of the aurora, are very much more frequent when the sun is most spotted, and rarely or never witnessed in the years of few spots."—*Sir John Herschel.*

And is it not an equally interesting fact, that those years on which the sun had few or no spots, and the action was most powerful, have been found to coincide with the years of abundance and cheap corn; and those on which the spots were numerous, and its action least powerful, with years of scarcity?—the electric action was then most manifest, and the wet and cold most prevalent. Now, in all these notable instances, there is seen not only a wide difference, but, if we may so express it, an essential and powerful antagonism between solar and electric influences. And may not this be in part explained by "Liebig's theory of a mutual and equal resistance between the vital force and destructive force of oxygen."

In the strange display of electricity, by rubbing the fur of a cat with the hands in cold weather, the connexion of the fluid with a state of cold is strikingly manifest. The colder the weather, the stronger the sparks which are then emitted. As this limited electric phenomenon requires a low temperature, so also do those on a large scale; little things being of

the nature of great things, a part may be sufficient as an illustration of the whole—a spark is of the same nature as a conflagration.

The commencement of storms, of rain, snow, and hail by electric action, at those high altitudes where the cold is intense, clearly shows the congeniality of the electric fluid with a low temperature. Hence in warm climates, its prevalence and force are to be connected with the gelid vapour with which it ascends and accumulates above the firmament, or the line of eternal snow. And as thence the tropical rain descends in torrents, so also the electric fluid is seen to come down from the high and frozen strata of the air. “The process of charging the (lower) atmosphere with electricity must thus go on from above downwards, so that the higher regions must be comparatively more charged with it than the lower, permanently. When, therefore, the upper currents come down into the lower, electrical manifestations, showing a disturbance of the usual equilibrium, must also be apparent, as indeed they are evident.”—*The Universe, a Chemical Problem.*

Cold being then a condition (we do not say the cause) of electric action, we ascribe its power in hot countries, not to the heat of the sun, but to the accumulation of the fluid, together with that of the ascending frozen water vapour, in the high and gelid regions of the air.

The effect of the respective influences of the two great powers of the sun and electricity on the seasons and the weather, is manifest to the eyes of all man-

kind. In regard to the sun, especially in tropical and eastern climates, how powerful and influential its action! For successive months the sky is clear and bright; no clouds obscure the heavens, and men have need to beware lest "the sun smite them by day, and the moon by night." Such, indeed, is the force exerted by the heavenly bodies, that were no other power to interpose, and to spread a veil between the heavens and the earth, solar heat would be unbearable, and the earth a scorched barren desert. But in order to mitigate the otherwise unsupportable intensity of a burning sun, there is a firmament—a region of vapour, clouds, and lightning, which, together with the waters above it, form an invaluable screen to cover us. Above this interposing canopy, the azure sky is all serene and clear, and there the stars of heaven are at all times beautifully and distinctly visible. Hence, either ascending up in a balloon, or standing on a lofty mountain side, men see thick clouds beneath them, by which the earth is hid from their view, while above and around them the blue sky is all beautifully tranquil.

Through the glassy roof of our famous Crystal Palace, the sun may be seen by day, and the moon and stars by night. But if this glassy covering were filled with thick vapour, or a darkening smoke, those lights of heaven would thereby be hid from the view of those beneath it. In like manner, intervening thick clouds hide the orbs of heaven from the world below. "I clothe the heavens with darkness, and make sackcloth their coverings." Albeit, those *orbs*

still shine with undiminished splendour above this dark and troubled atmosphere; all above and beyond this curtain of obscuring clouds, they continually show forth the glory of the Lord. Nevertheless, in a night of thick darkness, or a day of gloom and tempest, who would readily suppose that at an elevation of only two or three miles the interposing clouds and darkness terminated—while all above, the azure heaven is serene and clear, so that, however dark our world, and tempestuous our sky, the sun ceases not to shine by day, nor the moon and stars by night?

And here we may observe, in passing, that these alternations of light and darkness in the sky, by the hand of God, are frequently represented as a figure of his dealing with the nations. "When I will put thee out," (extinguish thee) "I will cover the heavens, and make the stars thereof dark; I will cover the sun with a cloud, and the moon shall not give her light. All the bright lights of heaven will I make dark over thee, and set darkness upon the land, saith the Lord God."—Ezekiel xxxii. 7, 8.

A pure atmosphere permits the free passage of the solar rays, which, when not obstructed by any haze or cloud, so illuminate the sky that even winter weather is serene and pleasant. And it is hence evident that the obscuration of the sun and sky, and the consequently increased cold, are referable to the intervening clouds and moisture. This indeed makes all the difference between a bleak, ungenial season, when snow is seen in June and July, and such a

summer heat as has been known in Britain to kill men and cattle working in the fields.

Now, the difference as to hot and cold weather is obviously referable to the power of electric influence on the water vapour of the sky. Aeronauts inform us of the alternations of heat and cold which they experienced in passing through the haze and vapour of the sky. "At times there came an insupportable heat; at others a cold from which I could scarcely defend myself under my furs, while the sun scorched our faces. In the same way, when among the ice you approach a fire, the cold and the heat make themselves simultaneously felt in all their intensity." The cause of the deadly cold in Syria, mentioned by Dr Thomson as having killed men as well as cattle within the space of one hour, and very near their houses, lay in an accumulation of very thick and gelid water vapour, by which the sun's influence was intercepted. "He giveth snow like wool: he scattereth the hoar frost like ashes: he casteth forth his ice like morsels: who can stand before his cold?" But for this interposal of the water vapour of the sky, which is wholly referable to electric action, the sun would, at the very hour of that deadly cold, be seen to shine intensely, as when it fills the land with light and gladness.

The connection between an atmosphere highly charged with electricity and the formation of hailstones, has been frequently remarked. When the hail is large, and especially when heavy blocks of ice are formed in the air, not only must the cold be intense, but electric action also very powerful. "Previous to

the occurrence of hail the barometer sinks very low, and what is unusual before rain, the thermometric column suffers a corresponding depression. The thermometer during a hail storm has been known to sink through 77° F. A peculiar rushing sound in the air is also indicative of speedy hail—by darkness, resembling an eclipse of the sun.”—*Scoffern*. In such cases the neutralization of solar heat by electric influence is further indicated by the fact that the largest hailstones fall in summer during thunder-storms.

In the northern latitude of Stockholm, the serenity of the sky so favours the heating of the ground by solar action that even in that severe climate the summer is hotter than in England. It is hence evident that the usual mildness of the seasons in Britain, as well as the occasional occurrence there of excessive heat and cold, is attributable to the changing, cloudy, moist condition of the atmosphere, and not to any variation in the action and power of the sun.

The great luminary of the world is continually pouring forth his invaluable treasures, while abundant moisture is arising from the earth and sea to fertilize the ground. But this moisture, which is raised by the process of vaporization, must be formed by another agent into clouds, and snow, and rain. After it is taken up from below the firmament, it must again be sent back, by electric influence, to refresh and irrigate the world. And water, which in the climate of Hindustan requires eight months to raise it up above the clouds in the state of an invisible gas, is in a much shorter time poured down by

electricity in deluging torrents of rain. This is the doing of the Lord, who "sitteth upon the flood." "When he uttereth his voice, there is a multitude" (a noise) "of waters in the heavens, and he causeth the vapours to ascend from the ends of the earth; he maketh lightnings with rain, and bringeth forth the winds out of his treasures."—Jer. x. 13. And when God is pleased thus to open the floodgates of heaven, not only does abundant rain descend, but storms, hurricanes, and whirlwinds, by the same agency frequently rush forth to agitate the world. All the while, however, the course of the sun is not intercepted, nor his light above the firmament obscured, nor his equanimity disturbed. He maintains his supremacy far above the clouds, among the stars of heaven. "His going forth is from the end of the heaven, and his circuit unto the ends of it; and there is nothing hid from the heat thereof." Yet he is under law to his Maker, and he must abide by that authoritative mandate. He knows the time when to rise and when to set, and is never one moment too soon or too late. But who can tell when the lightning is to come from the east, and to shine even to the west, so as to fill the sky with thunder, and darkness, and tempest? Thus those two great powers divide the empire of the world; for while the sun and stars supply the world with light and heat, and the earth and the sea fill the air with moisture, the seasons and the weather, the dew and the rain, the snow and the hail are determined by the lightning of heaven, which in its going forth is the voice of God.

Now, by the constitution of the world, the earth is, as at first, dependent on water, of which the large portion gathered together below the horizon constitutes the seas. It is, however, to the heavens and the water floating there, the earth cries for rain, according to the lively allegory of the prophet. But it is not in the heavens, as another prophet saith, to fulfil this request,—of themselves, and by the laws of their nature, the created heavens are as inefficient as the heathen gods. “Are there,” the prophet asks, “among the vanities of the Gentiles that can cause rain? or can the heavens give showers? art not thou he, O Lord our God? therefore we will wait upon thee, for thou hast made all these.”—Jer. xiv. 22. When, accordingly, the floodgates of the heavens are shut up, so that they cannot pour down rain, God graciously hears them, opens wide their gates, and pours down a blessing until there is not room enough to receive it. Thus God hears the heavens, and the heavens hear the earth, and the earth again, saturated by refreshing showers, hears the corn and wine, which are waiting to spring forth and satisfy the wants of hungry men.

The agency by which this is effected is in itself inert and powerless, until awakened and sent forth by a greater than itself. Yet by its operation, when thus prepared and sent, are the seasons regulated and the wants of the world supplied. Now, to employ it to this end, as befits the Great Ruler of the world, justice and goodness, no less than intelligence and power, are indispensable. And the more distinct our conceptions

of this ruling element and of the actual phenomena of the heavens are, the greater will be our confidence in the wisdom of an overruling providence.

How admirable the arrangements of the firmament! how majestic in their own simplicity are the works of God! The sun supplies the world with light and heat. Electricity condenses and collects the floating moisture of the air into overspreading clouds and refreshing showers. By its operation all the changes of the sky are effected. At one time so clear is the night, that the stars are seen to shine like lamps suspended from the sky; yet at other times so extreme is the darkness, that you cannot see your stretched-out arm, or where to place your foot. In tropical regions sudden darkness veils the sky, "the sun is darkened in his going forth." Such being the different, and we may say, conflicting influences of the electric fluid and the sun, is it possible to conceive of a greater contrast than that of their respective functions? When the one advances the other recedes. The sun illuminates and warms, and sometimes even scorches the world: electricity, by means of water vapour, cools, refreshes, and renews it. And how admirably do the persistency of the one and the versatility of the other subserve the purposes of Providence, and display the rich resources of creative wisdom. Absurdly, then, are both agencies placed in the same category as being equally under fixed invariable law. For on the one hand, assuredly there is nothing more fixed and constant than the great light that rules the day; while, on the other, there

is not anything so fitful and uncertain as the acting of that mysterious and potent element by whose varied evolutions the never ceasing changes of the world are evermore effected. God "has made everything beautiful in its season." "O Lord, how manifold are thy works! In wisdom hast thou made them all: the earth is full of thy riches."

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PROPHECIES AND CONDITIONS OF THE WEATHER.

NOTHING in the world of nature interests us more than the seasons and the weather. In those the life of all creatures is involved : there is not a living thing that is not affected by them. To the husbandman, the mariner, the traveller, the invalid, and, indeed, to society at large, the subject of the weather is evermore a primary consideration. Mankind have confessed the hand of God in it, and those who have attempted otherwise to account for it have "found no end in wandering mazes lost."

The number and variety of "the signs of heaven," including all aerial phenomena and changes, exceed all calculation. "The mutual action," it has been well remarked, "of those changes, and causes of change, complicate so greatly the actual phenomena of what is called weather, that it is proverbially the thing of all others least to be depended on, and in most temperate climates has come to be regarded as governed by no laws yet ascertained, and affording no appearances by which we can predict future consequences."—*Ansted's Elementary Course of Geology*.

Now here it is freely confessed that laws governing the weather are not ascertained, and that, as another author candidly confesses, "predictions of coming changes are mere guesses, as often wrong as right ;"

nevertheless, even he has confidently said that "all those changes are governed by certain laws—as certain as that gravitation binds the heavenly bodies together." Is there no misconception here? Is there no absurdity in supposing that irregular, uncertain changes proceed from regular and certain laws? Again, an eminent philosopher has observed,—"The weather seems not to affect any precise course of succession. Although two or more years of remarkable heat or cold often follow consecutively, yet there can be no doubt that atmospheric changes, however complicated and perplexing, are determinate in their nature, as the revolutions of the heavenly bodies. When the science of meteorology is more advanced, we shall, perhaps, by discovering a glimpse of those vast cycles which result from the various aspects of the sun, combined with the feeble influences of the moon, be at length able to predict, with some degree of probability, the conditions of future seasons."

—*Sir John Leslie.*

Now, the condition of the atmosphere constitutes the weather; and this is so extremely various and complicated, that the hope of being able to found predictions on it must be accounted exceedingly preposterous. The weather is not traceable either to cycles of the sun and moon, or to conjunctions of the planets. For though the climates of the world, as well as the vicissitudes of light and darkness, are doubtless determined by sidereal agency, the conditions of the atmosphere and its changes are far more dependent on the fitful and uncertain influence of

the electric fluid than on the steady action of the sun. How unlike are the regular and constant cycles of the starry heavens, and the persistent force of gravitation, to the irregular and fitful perturbations of the atmosphere, and the uncertain changes of the weather? "He appointeth the moon for seasons; the sun knoweth his going down." But who can anticipate the coming of the lightning and rain? and as for the wind, it "bloweth where it listeth;" "it whirleth about continually." It is hence evident that the limited and simple science of meteorology ought, at least in some degree, to be kept distant from the vast and comprehensive science of astronomy. For while astronomy embraces a boundless universe and innumerable spheres, meteorology is limited to the narrow region of the air, of which the lower space, all within four or five miles of the earth, is the place of clouds and tempests, lightning and thunder. And of these phenomena, how very different the evolutions and the changes from the admirable regularity and order of the planetary system? Accordingly, the calculator of eclipses knows what he says, and men believe him; but who believes Moore's Almanack, or other less celebrated prophets of the weather? For while the conditions of the atmosphere are doubtless influenced by the heavenly bodies, there are also other vital agencies of a more variable character, to which aerial phenomena, as vapour, tempests, rain, and snow, are to be attributed. And those agencies, again, are themselves ruled not by invariable laws, but by the fiat of

Omnipotence. And who can foretell the times and the seasons which the Judge of all the earth is pleased to appoint, or who could reasonably substitute a power of blind laws for the active and intelligent government of God ?

M. Babinet's Prediction.

There is, nevertheless, among men of science, a strongly expressed confidence in the steadfast dominion of insensate laws in relation to the weather, and hence their belief in the probability of being able to predict future changes and conditions of the seasons of the year. It has accordingly been said, "If we can trust the predictions of science, the period is arrived when we shall be blessed with a more steady temperature for a long time to come." The popular philosopher and natural astronomer, M. Babinet, of the Institute, gives us great comfort. "He expresses his conviction, that for many years to come, this country shall enjoy a regular succession of seasons—that spring will be no longer a continuation, if not an aggravation of winter—and that summer will not any more be cooler than autumn."—*Letter in the Times*. Alas that this comfortable prophecy should have been falsified by the winter and the spring (of 1860) which immediately succeeded, during which the weather was unusually unpropitious. Hence the *Debats* called the attention of the Government to the probability of a scarcity of corn in consequence of the prevalence of cold and wet weather in a great part of France.

Some of the recent predictions of the weather are wisely limited to a single day ; and thus, in times of old, observant men were content with such knowledge as the aspect of the sky appeared to indicate.—“When it is evening, ye say, It will be fair weather ; for the sky is red. And in the morning, It will be foul weather to-day ; for the sky is red and lowering.”—Matt. xvi. 2, 3. He said also to the people, “When ye see a cloud rise out of the west, straight-way ye say, There cometh a shower ; and so it is. And when ye see the south wind blow, ye say, There will be heat ; and it cometh to pass.”—Luke xii. 54, 55.

The crop of the same year which it was predicted would be abundant, was much below an average in Britain as in parts of France, in reference to which a distinguished agriculturist remarked, “Since our last very disastrous harvest, we have paid to foreigners £40,000,000 for foreign corn, being £30,000,000 over and above our usual average payments. This enormous abstraction from our annual profits has disturbed our financial arrangements, ruined or crippled many of our merchant manufacturers and traders, and has increased the value of money ; has limited credit, and thrown out of employment, wholly or partially, large masses of an industrial population. Farmers, and those depending on them, have suffered more than any other class. And if,” as he justly observes, “the anticipation of a short supply of cotton fills the public mind with alarm, surely still more anxious should we feel about corn, the food of the people.”

Nothing being so essentially needful for a people as the food they eat, what can be deemed more worthy of the care of God? He who pitied Nineveh, with her six score thousand persons "who could not discern their right hand from their left hand, and also much cattle," assuredly will not forget a land in which there are sixty hundred thousand such little ones, and also cattle without number. God "giveth to the beast his food, and to the young ravens when they cry." And even among nations "who walked in their own ways, he left not himself without witness, in that he did good, and gave them rain from heaven and fruitful seasons, filling their hearts with food and gladness." But if God is not acknowledged in the conduct of the elements through which the sustenance of all his creatures is produced, wherein shall we recognise him as the Judge of all the earth? What form of atheism can be more preposterous than the denial of his providence?

A deficiency of thirty millions sterling on the crop of one year, to be immediately followed by a most abundant harvest, is altogether referable to the fiat of unerring wisdom in governing the world. How could this extreme disparity at all accrue from continuous and steadfast causes, and unbroken sequences of invariable laws? To ignore the actual supremacy of God, by the alleged operation of such laws (laws not ascertained, and not proved to exist,) outrages common sense, subverts our natural notions, and flatly contradicts the explicit declarations of the word of God.

A law of nature, we may here remark, is a figure of speech, and denotes the mode of the acting of substances on one another. A law of nature consequently does not denote power or causality, nor the voluntary actions of living intelligent natures, but merely the order or manner of their acting. An augmented or diminished force or cause tells by an augmented or diminished consequence or effect. Alter the cause and you alter the effect. And as it is not in our power (for it is not in our nature) to believe an effect without a cause, so it is not possible to believe a persistent mighty cause, and a feeble intermittent consequence. A persistent power, an inherent, invariable force or cause, operates persistently as by invariable law. How, then, can the same power or law by which a rich abundance of rain or dew is given, in years of plenteousness, be supposed to operate with equal energy in years of barrenness and drought? The effect being changed from plenty to scarcity, or the reverse, there is of necessity a change also of the law—a palpable abatement or increase of fertilizing influences. Now, for the frequent and extreme variations of the atmosphere, there is no corresponding energy or force in nature to account; living power alone can solve the difficulty—only this can remove the burden of perplexity and doubt, and leave the mind at liberty to trace effects to their natural and true causes.

Mr E. Miriam's Experience.

“No such thing,” it has been said, “as weather

wisdom." Mr E. Miriam, of Brooklyn, New York, who has devoted a life-time to meteorological and atmospheric observations, &c., gives the following as the result of his experience:—"With all my practice and experience in observing atmospheric changes, and recording hour by hour, and day by day, thermometrical and meteorological observations, and in connection with simultaneous observations made and recorded elsewhere, I feel more and more convinced that it is not in the power of any human being to determine, even a single day in advance, what changes will take place in the atmosphere."—*Bell's Weekly Messenger*, Dec. 29, 1856.

If the weather and the seasons were regulated by fixed, invariable law, they would always be the same, year after year, and we should not need knowing men to predict or guess what was already known to be regular and certain, as succession of day and night, seed time and harvest. Inquiry into the law of storms is now strongly urged, and not without reason, if things to come may be foretold; for what hills and mountains are to the level places of the earth, hurricanes and tempests, in a manner, are to uniformity of ordinary weather. Now, a supposed law of storms must comprise their origin, force, direction, duration, and extent. Storms, however, being infinitely various, as indeed are all meteoric phenomena, who can hope to discover an invariable law by which they are directed? or who can believe that such a law can possibly exist?

In one respect storms are eminently lawless: as a

thief in the night, they come suddenly and unexpectedly. Antecedently to the commencement of the greatest storm, there is not perhaps, at least to common observation, the faintest sign of its approach. Like the coming of a ship from a distant shore, or a stranger from a far country, the first intimation of its coming is given by its actual arrival and approach. One of the finest mornings is presently followed by a widely spread, destructive hurricane. Hundreds of vessels, bearing rich cargoes, together with many valuable lives, are broken within sight of land, and in seemingly protected harbours.

Value of the Barometer.

Now, all reliable and timely warning of those destructive visitations is given by their actual occurrence. Both living creatures and things without life are seen to be affected when hurricanes approach. In particular, that invaluable instrument, the barometer, whose movements are ever in accordance with the force and progress of the tempest, gives the earliest and surest notice of it. In consequence of the magnetic changes of the atmosphere (for in these the storm originates), the mercury in the barometer necessarily falls. When its fall is observed to be sudden and continuous, the observer is apprised, and he is able confidently to apprise others of a coming tempest. Of the violent gale which, early in the summer of 1860, destroyed so many lives, and so great an amount of property, sailors said it broke out with remarkable suddenness. The magnetic

origin is not doubted. Of its approach, the barometer gave two days' clear notice, or rather we might say, it apprised the world of its own approach by its depressing action on that most sensitive and far-seeing instrument.

In other lands and climates, the laws and changes of the weather are, on the whole, of the same uncertain character as in our own. For example, in the eastern world, a lady and a gentleman had to go by sea to a place not far distant. A friend entreated them to put off going, because, from the appearance of the sky and the barometer, he was sure a violent hurricane was at hand. But as the captain was not afraid, it was determined they would risk it. Before they had been an hour at sea, the storm came upon them with awful fury. The lightning flashed, and the thunder roared around them, till "all hope that they should be saved was taken away." And still the barometer was falling—falling. Oh how anxious the sailors looked at it, and how their hearts failed when they saw it was going down! At length the lady, when nearly dead with fear, was told that there was hope—the barometer was rising. By that simple sign, they knew that the worst was past, and not long after they entered the desired haven.—*The Family Treasury*. 1860.

In all quarters of the world, hurricanes and tempests burst forth in a moment suddenly. In June, 1860, Cincinnati and its vicinity was thus assailed by a violent tornado. A densely black cloud appeared in the north-west, and soon after a terrible storm of

thunder and lightning burst over the city. Buildings were unroofed, steeples were blown down, immense property destroyed, and many persons seriously injured.

Of those sudden and terrific visitations, the best indicator doubtless is the barometer. "Nautical men, who have so great an interest in knowing the precursory signs of tempest, relate a multitude of cases of their connection with barometric oscillations. *Krusenstern* attributed the success with which he always knew how to anticipate gales of wind to the constancy with which he observed the barometer. Scoresby affirms that he predicted tempests seventeen out of eighteen times by consulting the barometer. My own observations show that we should fear a gale, especially in winter, when the thermometer is high and the barometer suddenly falls. Often, when I had observed these two signs, the tempest was not violent at Halle, but it was let loose over other parts of Germany and Europe. I might relate a great many examples of this kind, but whoever possesses a barometer may observe for himself."—*Kaemtz*, p. 318.

Most of our great storms are regarded as being of the nature of gigantic whirlwinds of several hundred miles in diameter. Scientific men give them the name of *Cyclones*. While the wind rushes furiously in a circle, the whole system has a rapid and progressive motion. The cyclone in which the Royal Charter was lost, and which was skilfully and successfully encountered by the Royal Fleet, reached the coast of Scotland several hours after its greatest force was spent at Liverpool.

Other storms proceed, not as the cyclone, in a circle, but right on, and are of a more limited extent. In the Barbadoes hurricane, 1831, "some houses were actually levelled to the earth, when the residents of others, scarcely a mile apart, were not sensible that the weather was unusually boisterous."

Storms different.

Storms remarkably differ in regard to duration. The strong wind, called Euroclydon, mentioned in the book of Acts, continued its violence fourteen days. In other cases, like that of the wind that overthrew the house of Job's sons, a sudden blast commits dreadful ravages, and presently passes away. Thus, not long since, the strong military buildings erected by the French Government in Algiers, were suddenly demolished by a mighty wind, which lasted only ten or fifteen minutes. Of such sudden, violent, and local blasts, the instances are various and many. We are, however, most conversant with those of a more widely spread and enduring character.

"Magnetic storms," it has been remarked, "arise without the least warning, are felt simultaneously in different quarters, and extend, after a brief interval, over the surface of the globe. Wherein they arise has been a puzzle to the learned. After the closest observation, philosophers are unable to decide with any certainty whether the disturbing influence reside in cimmerian caverns of the earth or in the atmosphere."—*Fullom*, p. 149. But to any who consider the constitution of the atmosphere, and the exceed-

ingly diversified and untraceable procedure of magnetic agency, such storms, however violent, various, and sudden, need be no puzzle, being wholly incomprehensible as to their origin and progress. And if, *after* they have spent their force and done their utmost, they are still deemed a puzzle, how hard is his task who stands watching their initiatory movements, or who would presume to foretell their forthcoming from the womb of the future. He who can discern their approach ere barometer, or leech, or bee, or any other creature can be affected by their coming, doubtless merits the high honour of being counted *weather wise*, and a trust-worthy expounder of the law of storms. To attribute hurricanes to perturbations of the air, is more calculated to puzzle than to satisfy the mind. "In physical nature," it has been justly said, "there is no disturbing force. When perturbations are spoken of, no more is meant than that there is a force which has not been recognised." It cannot, then, be supposed that according to the doctrine of fixed, persistent laws (and such are certainly the laws of the physical creation), an actual disturbance of the elements could result from their operation, which must needs be equal and constant. When you have reflected on the numberless degrees and forms of aerial phenomena, you will the more easily conceive of the utter hopelessness of discovering a fixed law by which they could possibly be governed, or the manner and the time determined in which they shall occur.

Of the climate and the weather still experienced in Syria and Palestine, Dr W. M. Thomson, who has

resided there twenty-five years, gives us much reliable information, in his valuable work, entitled *The Land and the Book*. "Contrary to all my previous ideas," he says, "I find your climate extremely variable and uncertain. There seems to be no fixed time for the commencement of the winter rains, nor is it much more certain when they will cease. That is quite true. I have seen these rains begin early in November and end in February; but they are sometimes delayed until January and prolonged into May. There are, indeed, great variations, and they subject the farmer to much uncertainty and many losses."

In the rain itself of that country there are striking variations, as "a sweeping rain that leaves no food." "A small, black cloud traverses the sky in the latter part of summer or the beginning of autumn, and pours down a flood of rain that sweeps all before it. In the neighbourhood of Hermon I have witnessed it repeatedly, and was caught in one last year, which in five minutes flooded the whole mountain side, washed away the fallen olives, the food of the poor, overthrew stone walls, tore up the roots of large trees, and carried off whatever the tumultuous torrents encountered, as they leaped madly down from terrace to terrace in noisycascades. Every summer threshing floor along the line of its march was swept bare of all precious food; cattle were drowned, flocks disappeared, and the mills along the stream were ruined in half an hour by the sudden deluge. Wherever it came 'it left no food behind it;' and such is the oppression of a poor man that oppreseth the poor."—p. 321.

Again, he informs us "There has been a smart shower here, while at Semark the ground was baked hard and the grain drooping sadly. The same was true on a former occasion, when I came up the Jordan valley. The ground in the Ghor was like a parched desert. There had not been sufficient rain to bring up the grain, and "the seed sown had rotted under the clod," while at Tiberias the whole country was a paradise of herbs and flowers. And thus it was in former times. The Lord 'caused it to rain upon one city,' says Amos, 'and caused it not to rain upon another city: one piece was rained upon, and the piece whereupon it rained not withered.' There are other interesting allusions to matters in agricultural experience in this passage of Amos. 'I have withdrawn,' says God, 'the rain from you when there were yet three months to the harvest.' This is utterly ruinous to the hopes of the farmer. A little earlier or a little later would not be so fatal, but drouth *three months before harvest* is entirely destructive." —p. 395. "All kinds of crops, including silk, fail more frequently in Syria and Palestine than in America."—p. 90. "May not these facts," remarks the narrator, "give greater point and significancy to those agricultural promises (if one may employ such language), in which regularity in the rains and certainty in the crops were guaranteed to Israel on condition of faithful obedience."

In like manner, as in Syria and Palestine, the rains of Europe and America exhibit much variety. "On the morning of the 3d of February, 1842, rain was

falling at the same time throughout nearly every part of the United States of America. Over an area of at least a million of square miles there was, for hours, identical weather. And there have been other instances recorded when the whole of Northern Europe has been under the influence of rain clouds at the same instant and for the same time."—*Cornhill Magazine*. This year, 1861, while the rain in Britain has been plentiful, and the temperature moderate, there has been in parts of Spain excessive overpowering heat, together with a scarcity of rain. And from one place in France a continuous drought of six entire months is reported. Is it not hence evident that the rains of the world, and the hail, which is equally variable, are not the product of inexorable and invariable causes, but the gift of an ever active, righteous, and overruling providence? And this further remarkably appears in certain changes of temperature.

The cold in this our country, at the end of Dec., 1860, was more intense than had been experienced for fifty years. The mercury fell to twelve degrees below zero, and individuals who travelled in open vehicles were frozen to death. Dr Thomson informs us of a far more intense and deadly cold in Syria—a more southern latitude than that of Malta, Candia, and Cyprus. "The plain of Jjon," he says, "has lately been rendered famous by a most extraordinary storm. It was on the 28th of December, tall columns of mist were seen by friends of mine over the marsh of Huleh. They came very rapidly, and soon broke upon them with awful fury. Those who attempted to reach

Khyam perished in the plain, although it was no more than two miles wide, and in full view of their houses. Thus, ten men died in a few minutes from the mere chill of this wonderful wind. There was no snow, no frost, and not much rain ; but the wind was perfectly awful, driving and upheaving everything before it. These cold winds draw out all animal heat with amazing rapidity. Not only were these men chilled to death almost instantly, but eighty-five head of cattle also perished before they could be brought to the village. The inhabitants had no tradition of a similar catastrophe. I examined into the accuracy of the facts on the ground, and know them to be true. It reminds me of David's horrible tempest."—p. 224.

Fogs and Mists.

Of fogs and mists, the variety, as of other atmospheric phenomena, is beyond description. "That of 1783 caused a general sensation throughout Europe. Its thickness was such that in some places objects at the distance of five kilometers could not be distinguished ; they sometimes appeared blue, or else surrounded with vapour. The sun appeared red and without brilliancy, and could be gazed at in the middle of the day. At its rising and setting it disappeared in a haze. At Copenhagen it came after a succession of fine days. In other places it was preceded by a gale. In England it came after continuous rains. It was noticed almost everywhere in Germany, France, and Italy, from the 16th to the 18th June. On the 25th it was observed in Moscow ; towards the end of

June in Syria. Many hypotheses were devised in order to explain its origin. *Lelande* attributed it to the quantity of electricity developed during a very hot summer that succeeded a moist winter. *Cotte* regarded it as formed of metallic emanations united with electricity, in consequence of the great heat and numerous earthquakes. Other philosophers have connected this fog with electricity, without our being able to understand how the latter is able thus to disturb the atmosphere. *Veltman* has shown that those phenomena are concomitants with the great peat-burnings that took place in Westphalia."—*Kaemtze*, pp. 468, 9.

And is this all our philosophers can tell us about the cause of this remarkable phenomenon? How far are their "oppositions of science" from dispelling the mistiness in which they place the "signs of heaven," when, in all their inconceivable diversity, they ascribe them to some uniform unbending law, through which, they affirm, "all things continue as they were from the foundation of the world."

The foregoing few instances of atmospheric changes are as nothing to the "numbers without number" of meteorological phenomena: they are merely as the portraits of a few individuals, to the endless diversity of the human countenance, of which no two have ever been the same. Our daily meteoric tables sufficiently show that the conditions and aspects of all the regions of the sky are continually changing, so that it may well be doubted whether they were ever once the same as now, at any moment since the

world began. There has been, it is supposed, during the past season (1861) more lightning and thunder, with heavy rain, water-spouts and sweeping torrents, than has been known for many years. They descend in various localities, more or less distant from one another, and with every degree of intensity, while in the parts intervening they are not perceived. Nay, of the weather of any one day within the limits of our island, how very various the aspects, as shown by our daily wind and weather reports. The following instances are selected from a great number, which together show a similar variety :—

September 7, 1861.		September 14, 1861.	
Aberdeen,.....	N.N.W. fine.	Bristol,	W.N.W. stormy.
Hull,	W.N.W. rain.	Edinburgh, .	S.W. fine.
Lowestoft,	W. blowing.	Liverpool,...	N.W. rain.
Whitehaven,.....	N.N.E. dull.	London,.....	N.W. fine.

This report implies an equally different condition of the sky, on all other days, in these and all other places. Here, then, is valuable information furnished by our daily journals, of which all may judge, as indicating, on one hand, either a government of fixed laws, or, on the other, a special divine providence. If there are indeed fixed and certain laws to regulate the seasons, then a true prophet of the weather, deriving his knowledge of it from these very laws, can distinctly foretell all atmospheric changes and phenomena—as fine, cloudy, rainy, stormy, together with the temperature. Here, however, is seen extreme irregularity, with respect to the nature, time, place, duration of all aerial phenomena. Therefore,

as has been justly remarked, "Science must end where irregularity begins—that is, where the facts with which it deals come no longer to be susceptible of classification."

Is there indeed any data, or fixed determinate law, by which lightning, wind, rain, hail, falling stars, aerolites, water-spouts, luminous and fiery meteors, aurora borealis, and whatever else finds a place in the atmosphere, can be proved to be governed? Do they all, or any of them, follow in due order as to time, space, and action? Who now can tell what changes are approaching, how far they will extend, how long continue, and what they shall accomplish? A law of conflagrations would surely be counted a chimera: no conflagration follows in the wake of its predecessor—each burns and devours in a way of its own. And, in like manner, all the evolutions of the atmospheric elements, instead of showing order and sameness, present the most extreme diversity. What two of them have ever been alike? Who, indeed, can suppose that any two clouds, or any two atmospheric currents, or any two showers of rain, or thunder storms, were ever, in all respects, the one like the other? And they all occur and pass away at unequal intervals, and each in a manner of its own. During those intervals, the fancied law of storms is in abeyance and utterly inactive, as if its power were gone: it is then, indeed, if anything, a law of calms and not of storms. Again, however, the impulsive genius of aerial disturbance awakens and goes forth; and forth also sally our observant wise men, to ascertain its evolutions and its laws.

“In spite of all the millions of meteorological observations which have been accumulated up to the present time, it must,” remarks a well-informed writer, “be confessed that very little good has been got out of them, and for a reason inherent in the nature of meteorological inquiries, in which more than in any other science a complete correlation of the results obtained by all the workers is required to ‘crown the edifice.’ One of the main results is that our present knowledge is not sufficient to enable us to predict weather; that, in fact, there is no scientific basis on which to rest *daily forecasts*.”—*Macmillan's Magazine*. August, 1866.

Of the supreme potency, and certain fixed orderly progression of those laws of the sky, no doubt is entertained. “When,” it has been said, “the winds are let loose from their prison house; when the heavens become dark, and the clouds, rent by the lightnings, pour down their contents, and the swollen torrents carry desolation down the mountain side, and over the wide plain; when the ocean rolls in upon the land its giant waves; when the tornado-sweeps all before it in rich tropical regions; when the sirocco sends its hot blast, loaded with sand, over the devoted surface; in all those cases, how difficult for us to conceive that all this uproar among the elements is limited, and controlled by laws as fixed and unalterable as those which regulate the heavenly bodies.” (Very hard, truly, to conceive, and still harder to show why it must be so.) “Nevertheless,” saith our revered philosopher, “it must be so; and, although

the winds and the waters seem to be rioting at their pleasure, there are, in fact, at work, antagonistic agencies which will confine their wild roar to a narrow field, and soon bring them again to a peaceful submission. In other words, the repressing agency," (and what, pray, may that be?) "has always been superior to the destroying force, when the battle has risen to a certain height." But here we may be allowed to ask, what atmospheric force is greater than that of solar heat and electricity? In these consists the chief disturbing and impelling power, and there is none greater, except the strength of the almighty arm that wields it. Now, in what manner all this process and disturbance of the elements, which has been infinitely varied from day to day, and has never ceased to vary since the world began, can result from and be ruled throughout by laws which cannot vary, but are ever fixed and uniform, is the darkest of all enigmas—the mystery of mysteries, which none of the sons of men, not even our philosophers, have been able to reveal. Nevertheless, they believe it, though they do not understand it; and you, also, may believe it, if you can.

The atmosphere has been compared to a machine, for which, like an engine constructed by the hands of man, pabulum must be supplied. The discharges, for example, of the fire engine are in proportion to the pabulum and force employed in working it. Hence, in its working, intermittent and unequal effects would be falsely attributed to equal and constant causes. Philosophers confess the impossi-

bility of conceiving an effect without a cause. "Facts ought to be explained by causes proportioned to them."—*Renan*. Will they tell us how we may conceive of variable consequents, as resulting from invariable antecedents? Will water freeze on the same fire on which it formerly boiled? or a ship advance at the rate of five or ten miles an hour indifferently, by the same propelling force?

Nothing better shows the relation of cause and effect, in aerial phenomena, than our common scientific instruments, the thermometer and the barometer. The mercury in both sometimes vacillates and sometimes stands still. It rises or falls as the atmosphere is either colder or warmer, heavier or lighter. When it changes from heavy to light, or when its temperature changes from cold to warm, or *vice versa*, the mercury rises or falls. Now the variations of the atmosphere, which is the cause of the vacillations of the mercury in both instruments, is itself an effect of variable solar and electric action. And this simple fact is the more worthy of our consideration, that it extends to the climates and the seasons of the world. For the solar power by which the mercury rises in the thermometer is, at the same time, raising the temperature of the air every where; while the magnetic force, which depresses it in the barometer, is then also moving the winds of heaven, and sending down the rain and the snow upon the earth. And both effects equally show that neither the mercury vacillates, nor the weight and temperature of the atmosphere varies, or indeed can vary, by an invariable law.

Men will arrogate what is impossible with God, because opposed to the truth and the nature of things. "God abideth faithful; he cannot deny himself." He is the God of truth no less in his works than in his word. He has given everything its own nature, properties, and laws, and not those of any other. Is anything both fixed and moveable? uniform as gravitation and fickle as the wind? So contingent and unequal is the condition of the elements on which mankind depend, that not even the wisest know what is next to follow. The philosophy of men who know the mind and works of God, assures us that the variable and the periodical, the intermittent and the constant, are regulated by unerring wisdom, in a perfect adaptation to the nature of things and the great ends of moral government.

During a long period of drought there is indeed a painful regularity and sameness. "Thy heaven that is over thy head is brass, and the earth that is under thee is iron." And if this continue seven years, or even half that time, with what anguish do mankind regard it? "Are there any of the vanities of the Gentiles that can cause rain? or can the heavens give showers?" Are the laws of the weather not able to control them? Who does not then desire to see the aspect of the sky changed, and its elements in motion? And when, in mercy to the world, the condition of the elements is changed, "there must be also of necessity a change also of the law." Such is clearly the lesson taught by the lively allegory of the prophet. "I will hear, saith the Lord; I will hear the heavens,

and they shall hear the earth ; and the earth shall hear the corn, and the wind, and the oil ; and they shall hear Jezreel." While fixed, inexorable law denies relief, the mighty God, by whom all things are upheld and governed, overspreads the heavens with clouds, and sends a plenteous rain : the due working of the celestial machine can be effected only by the wisdom that constructed it.

The scripture doctrine, which we shall consider presently, in regard to the seasons and the weather, is simple, intelligible, and consistent—the scientific hypothesis gratuitous, incongruous, and unsatisfactory. The mutual dependence of evaporation and rain, the treasuring up of the vapour of the world above the visible horizon, the opening of the flood-gates of heaven by the wonderful agency of the electric fluid, " the lightning for rain " that is waiting to be sent—and is sent by God alone,—are all intelligible facts, and all in harmony with one another, and with all the phenomena that science has discovered. Below the azure vault of heaven the clouds are seen to form, and for the purposes of rain to be fed by the waters which are above the firmament, and which during periods of drought had been ascending continuously to the upper regions of the sky. Then is seen " the lightning of thunder "—" the voice of the Lord upon many waters." Why should this vital and matchless power be ignored, or its paramount function be superseded, by a chimera called *law*? or why should the far larger portion of the sky—all above the snow line—be reduced to empty, useless

space, and the narrow region of the clouds be supposed to contain all the waters said in scripture to be "above the firmament?"

Of all considerations which seem to subvert the hope of being able to predict the weather, or discover laws for the regulation of it, that of the procession and effects of the electric fluid is doubtless the most formidable and confounding. To the action of this paramount and potent agency the Creator has been pleased, in a manner, to subject all the atmospheric substances and forces of the globe. Innumerable currents of it are ever moving through the air, and these are not like mists and clouds that are carried by the wind. Electricity obeys a higher power, as when the hand of man, with well-considered purpose, sends it forth to execute his pleasure. An agency on which the temperature of the seasons, all changes of the weather, and consequently the life of every creature, is so remarkably dependent—an agency which is speedy, powerful, multifarious, universal, if not self-governed, like the living mind, must be under the control of a greater than itself. Heat, air, water, are not competent to govern it. You cannot place it in the category of things amenable to fixed law. One who knows how to make "a decree for the rain and a way for the lightning of thunder," and how to direct its course and control its actions, is alone worthy of dominion over it. Scripture informs us that God calls the lightnings that they may go, and they say unto him, "Here we are." He also gives his angels power over it—a power which those celestial

intelligences often used in times past, and, we believe, still use, for most important ends. How admirably have mankind learned its manifold uses in the system of the world, and its manifest subserviency to the power of mind! Bring this subtile, versatile, and very potent agent under the dominion of a fixed, insensate law! Who can entertain so preposterous a hope? An insensate, fixed, persistent law to govern the lightning and thunder, to direct the whirlwind, and the tempest, and the rain, together with a varied host of luminous and fiery meteors, is a wild chimera, by whomsoever entertained.

SCRIPTURE DOCTRINE OF THE COURSE OF NATURE.

BETWEEN certain philosophic speculations on the one side, and the doctrine of scripture on the other, when it speaks of natural phenomena and changes, there is evidently no agreement. And if on this account some religious people have disliked such speculations, believing them to be absurd and hurtful, not a few philosophers have, on their part, impugned the truth and authority of scripture as unworthy of credit, in regard to the material creation. Yet who should best know the constitution of the world and energies by which it is sustained? The inditer of the scriptures, as remarked by Lord Bacon, "knew four things which no man attains to know; which are the mysteries of the kingdom of glory, *the perfection of the laws of nature*, the secrets of the heart of man, and the future succession of all ages."

One palpable difference between sacred writ and science here demands our particular attention. In the former, a clear line of demarcation is uniformly drawn between things occasional, temporary, and contingent, and such as are regular, continuous and permanent. Yet this obvious and essential distinction is ignored by thousands of philosophers. In their reasoning on the course and phenomena of

nature, they place in the same category, as equally resulting from one and the same great invariable law, the lightning's sudden flash, and the sun's enduring splendour; the variable shifting of the wind, and the constant flowing of a mighty current—phenomena and results the most different imaginable.

Now, in no instance are all these different phenomena confounded in the Bible, as being all alike governed by the same fixed persistent law; on the contrary, they are always unmistakably distinguished. And this well accords with the great stress which is always laid in scripture on the importance of discerning things that differ. In sacred writ, the faculty of wisdom or understanding is described as consisting chiefly in the power of a clear and just discrimination. And certainly the distinction, to which we have adverted, of things either occasional or constant, temporary or enduring, is not only in itself simple, but clearly most essential towards forming a just judgment of the works of God, and indeed not less of the doings of mankind. “Bear in mind,” said a distinguished nobleman, in addressing the alumni of the Glasgow University, “bear in mind that the power of discriminating between the accidental and the necessary, between the occasional and the constant, between the temporary and the permanent, between the exception and the rule, is the quality which ought especially to distinguish the educated man.”—*Lord Elgin's address on his installation as Lord Rector of the University of Glasgow, December, 1859.*

The needful distinction, so well and fully stated in the foregoing quotation, is plainly overlooked in that which follows :—"The weather depends upon no arbitrary changes in the will of God, but on laws as fixed and certain as those by which the seed becomes a plant, or by which a stone falls to the ground. We know little as yet about the laws of the weather: but this we know more and more certainly, that it has laws; that even in this variable climate of England, the rules of the weather are really fixed and perpetual, as they are in those countries where the wet season and the dry, the hot season and the cold, follow each other year after year with unvarying regularity. Yes, here as elsewhere, every shower and every sunbeam is preordained from the foundation of the world. God has given them a law which cannot be broken, and they continue to this day, according to his ordinance, serving him and fulfilling his word."—" *Why Should We Pray for Fair Weather.*"—*A sermon, preached by Charles Kingsley, M.A.*

In this explicit statement of modern scientific faith, the sunshine and the shower, the constancy of gravitation, and the fickle ceaseless changes of the weather, are made equally to result from fixed and constant laws. Is not this to confound the temporary and the permanent? When our most astute and able writers, who, with truth upon their side, could make any problem clear and certain, gravely advance a palpably egregious and antisciptural hypothesis, must we not impute this to their too implicit confidence in the dogmas of a vain and dominant philo-

sophy. How different their doctrine from that of inspiration! Inspired men, in speaking of creation and providence, never fail explicitly to recognise and clearly to distinguish two classes of phenomena, and consequently two codes of law—the general and the particular, the temporary and the permanent. Of the latter it is said—“For ever, O Lord, thy word is settled in heaven. Thy faithfulness is unto all generations; thou hast established the earth, and it abideth. They continue this day according to thine ordinances: for all are thy servants.”—Psalm cxix. 89-91. The solar system fitly symbolizes the immutability of God’s covenant of mercy and salvation. After stating that covenant, the prophet Jeremiah adds: “Thus saith the Lord, who giveth the sun for a light by day, and the ordinances of the moon and the stars for a light by night. If those ordinances depart from before me, saith the Lord, then the seed of Israel shall also cease from being a nation before me for ever.”—Jeremiah xxxi. 35, 36. To this primary and greatest ordinance stands immutably related God’s covenant with Noah. “While the earth remaineth, seed time and harvest, and cold and heat, and summer and winter, and day and night shall not cease.”—Genesis viii. 22.

You will accordingly remark that the scriptures nowhere teach us to expect a suspension or discontinuance of those great fixed ordinances of the starry heavens. We are nowhere taught that their course may be interrupted, or their order changed. In miraculous operations, as when God created the

world, and again brought the deluge on the earth, he did what he pleased. "He spake and it was; he commanded, and it stood fast." But who, in the absence of "signs and wonders, and mighty deeds," ever prayed for a change in the established order of the universe? Albeit, there are ordinances of another kind. In reference to these, God, in answer to prayer, and in compassion to mankind, has done, and will do, great things without number. The phenomena and changes for which we are authorized to pray, and do therefore pray in confidence, are all designed to minister to our necessities. Being variable in their nature, and occasional in their occurrence, and wholly attributable to such agencies as God is pleased continually to employ, they take place when, and where, and how he pleases. Inspired men accordingly looked to God alone, and in no instance to blind insensate laws and invariable sequences, for providential mercies and deliverances.

Solomon, who was a close observer of universal nature, distinguishes those two classes of phenomena—the variable and the constant. He speaks distinctly of fixed enduring principles. "The sun also ariseth, and the sun goeth down, and hasteth to his place where he arose. All the rivers run into the sea; unto the place from whence the rivers come, thither they return again. The thing that hath been, it is that which shall be; and that which is done, is that which shall be done: and there is no new thing under the sun."—Eccles. i. 5, 7, 9. But while the wise king of Israel marks the standing ordinances of creation, he also recognises the variable

dispensations of divine providence, and tells us plainly why we should pray for seasonable weather, and all needful mercy and deliverance. In his comprehensive prayer, at the dedication of the temple, he thus addresses God—"When the heaven is shut up, and there is no rain, because they have sinned against thee ; yet if they pray towards this place, and confess thy name, and turn from their sins, when thou dost afflict them ; then hear thou from heaven, and forgive the sin of thy servants, and of thy people Israel, when thou hast taught them the good way wherein they should walk ; and send rain upon thy land, which thou hast given to thy people for an inheritance."—2 Chron. vi. 26, 27. In this the people of Israel were happier than the nations who worshipped "gods that could not save."

Solomon, in his solemn supplication, forgets not the stranger, of whom Moses said in the law, "Thou shalt neither vex a stranger nor oppress him, for ye were strangers in the land of Egypt." "Moreover, concerning the stranger, who is not of thy people Israel, but is come from a far country for thy great name's sake, and thy mighty hand, and thy stretched-out arm ; if they come and pray in this house, then hear thou from the heavens, from thy dwelling place, and do according to all that the stranger calleth to thee for !" But why should the stranger at all pray, unless he had been instructed to believe that the God of Israel, the true and living God, who made the world and all things, was in deed and in truth the sustainer of it and the governor among the nations ? Would

it not be to the stranger a new and happy idea to receive from God the answer of his prayers? He had known the impotence of idols, "the work of the hands of the craftsman," of whom the prophet has said: "Can any of the vanities of the Gentiles give rain?" The stranger, now a worshipper of God, and taught the way of truth, would ask in faith, and God would graciously hear him. And happier surely still the man who knows the true and living God, whom he also knows to be "the God of love and peace," than the stargazers and astrologers, who rely on nature, and anxiously observe the aspect of "the hosts of heaven." To trust in the living God is assuredly more blessed, as well as more rational, than to ascribe to blind, inexorable, nay, unknown and inexplicable, laws, the varied blessings we receive from the hand of God according to his word.

The answer of God to the prayer of Solomon is most explicit and assuring. "If I shut up heaven that there be no rain, or if I command the locusts to devour the land, or if I send pestilence among the people; if my people, who are called by my name, shall humble themselves, and pray, and seek my face, and turn from their wicked ways; then will I hear from heaven, and will forgive their sin, and will heal their land."—2 Chron. vii. 13, 14. And seeing all phenomena must needs occur in perfect harmony with both the properties of nature and the purposes of the Creator, how could the events of providence, as adapted to our physical and moral state, result from fixed, unbending law, and not from righteous, in-

telligent volition? Physical substances and properties, being in their nature inert and dead, are, of necessity, inflexible and constant; for God has made them so, and we cannot reverse it. But the vicissitudes of time and the mutations of the elements, like the currency and chattels of the realm, or the actions of the living, are ever subject to such modifications as the state of society demands. Some, indeed, agree to ascribe to God the regulation of the seasons, and also providential occurrences, not because he actually interposes or truly governs by his power, but because the forces and sequences of nature, being all fore-ordained and set in order, may be therefore said to be his work. This is not the teaching of the word of God. For as the drying up of the Euphrates, as predicted by the prophet, was not of nature alone, but by the power of Cyrus, so the tempest, the lightning, and rain, as sent by God, fulfil their "marching orders." "He that calleth for the waters of the sea, and poureth them out upon the face of the earth—the Lord is his name."

It is, then, within the needful range of the variable and the intermittent we are taught in scripture to expect an answer to our prayers; and, accordingly, the Bible, with uniform consistency, draws a clear line of demarcation between things fitful or temporary and such as are permanent and constant. Shall we reject this intelligible doctrine for a theory which would refer all changes and events, the variable and the constant, to one and the same unbending and persistent law?

Paley's remarks on the structure and order of *the world* is justly applicable also to the order and conditions of *its government*. In both it is manifest "that order is not universal." "A principle of order," he observes, "acting blindly and without choice, is negatived by the observation that order is not universal; which it would be if it issued from a constant and necessary principle—nor indiscriminate, which it would be, if it issued from an unintelligent principle. In the structure of the eye (for we adhere to our example), in the figure and position of its several parts, the most exact order is maintained. In the forms of rocks and mountains, in the lines which bound the coasts of continents and islands, in the shapes of bays and promontories, no order whatever is perceived, because it would have been superfluous."

While, then, there is undoubtedly an established and invariable order in the universe, there is no less evidently a perpetual succession of irregular and ever-varying phenomena; all, however, most skilfully adapted, by divine wisdom, to the welfare of the world. This is the general belief of mankind, as well as the explicit doctrine of scripture. The hypothesis that would refer uncertain and irregular phenomena to regular and fixed causes, bears falsehood on the face of it. Will its abettors tell us that whether the pulse is quick and strong, or slow and feeble, the action of the heart, and the circulation of the blood are the same? Without two classes of phenomena, and, so to speak, two codes of laws, the one fixed and uniform, the other variable and con-

tingent, the world as now constituted could not endure. In accordance with fixed laws, we cultivate the soil, and order all things. It is indispensable to know, that "whatsoever a man sows, that shall he also reap," and that "what has been, shall be." The succession of the seasons is as certain as the recurrence of the day and night; and both equally certain, as the annual and diurnal revolutions of the earth. But how uncertain atmospheric changes—the health of plants and animals, together with the often formidable agency of insect tribes. Peace, war, scarcity, and plenty, have variously succeeded one another since there were nations on the earth. And these vicissitudes have frequently been sudden and extreme; and, as respects the elements of nature, hitherto inexplicable on the principles of modern science, but clear and intelligible on the higher and more comprehensive principles of scripture, which, while they recognise the established course of nature, equally maintain the sovereignty and the power of the Lord God. God speaks to us in his word, not only as "the just God and the Saviour," but as the Architect and the Ruler of the heavens and the earth. "I clothe the heavens with darkness, and make sackcloth their covering."—Isaiah l. 3. And in order to restrain and punish the wickedness of men, he appoints a burning sun and a parched earth. "Thy heaven over thy head is brass, and the earth under thee, iron."—Deut. xxviii. 23. He employs insect tribes to chastise the disobedient: the fruit of the earth is devoured by "the locust, the canker-

worm, and the caterpillar, and the palmer-worm, his great army which he sends among them."—Joel ii. 26. He claims the prerogative of still sending sorer judgments—"the sword, and the famine, and the noisome wild beast, and the pestilence, to cut off man and beast."—Ezekiel xiv. 21. Again these evils terminate, and men, when they repent and turn, enjoy the goodness of the Lord. "I will rebuke the devourer for your sakes, and he shall not destroy the fruits of your ground; neither shall your vine cast her fruit before the time in the field, saith the Lord of hosts. And all nations shall call you blessed: for ye shall be a delightsome land, saith the Lord of hosts."—Malachi iii. 11, 12. Now, certainly, war, famine, pestilence, inundations, tempests, drought, rain, scarcity, and plenty are only local and occasional, and not to be accounted for as the sure and inevitable consequents of fixed, established antecedents. Philosophy and science have in this inquiry been unquestionably "blind leaders of the blind." The Bible alone assigns an adequate cause, by ascribing all such events to God's almighty omnipresent interposal, in which variety, adjustment, adaptation, as well as uniformity and steadfastness, are equally displayed. Accordingly, we believe in his power and immutability: we believe also in his wisdom, truth, and goodness, and his ever watchful care. He sustains the order of the universe, and at the same time righteously governs it as a sovereign and benefactor. "God," as Liebnitz well remarks, "has the qualities of a good governor, as well as of a great architect."

As to the new-fledged hypothesis of some great and paramount comprehensive law, and the same invariable order prevailing universally, and God merely looking on, like the gods of Epicurus, both the book of God, and the actual administration of the world, demonstrate its falsehood and absurdity. It is heathenism in its worst forms of perversity and blindness, the sullen atheism, which mutters in the heart, "No God." "From the earliest times, it has been the belief of seriously reflecting men, that a system which professedly recognises the divine being as the Creator of the world, but practically excludes him from the government of its affairs, however *theoretically* different from atheism, is substantially the same with it."—*Nature's Laws, by the Rev. Dr James Buchanan.*

In human conduct and experience, how are things uniform and things different distinguished? How widely are they found to differ! "Uniformity without diversity," says Pascal, "is useless to others; diversity without uniformity ruinous to ourselves. The one is injurious externally, the other internally." As to the system of the world, uniformity of heat and cold, drought and rain, would ruin all; while, as respects the position, motions, and attraction of the heavenly bodies, diversity would destroy all. Can any one conceive of a single law by which such uniformity and such diversity could be both effected?

The beautiful variety and adaptation so strikingly displayed in natural phenomena, and the providence of God—all "working together for good,"—can by

no hypothesis be referred to physical and blind unbending law. In vain is it asserted that one such great law controls the system of the world, in which is very manifest "innumerable diversities," both physical and intellectual. "Considerations, these," says Sir John Herschel, "which are not lost on those who believe that they can trace in nature the operation of motive and design, as distinct from a mere necessity arising out of the nature of things, and the conservation of *vis viva*." The advantages accruing from motive and design, cannot possibly arise from fixed inexorable law. "It is quite evident," says Dr Brown, "that even omnipotence, which cannot do what is contradictory, cannot combine both advantages—the advantage of regular order in the sequences of nature, and the advantages of an uniform adaptation of the particular circumstances of the moment, to the particular circumstances of the individual. We may take our choice, but we cannot think of a combination of both." Mental energy, and the spontaneous doings of the living on the one hand, and the processes and transmutations of things inanimate on the other, being altogether different, cannot be combined and governed by the same law—of themselves the latter are unalterable. A thing without life cannot help itself; but by living interposals, "all things are possible." By it the face of nature is speedily and beneficially changed. The wilderness, cleared of its jungles, thorns, and briars—the habitation of dragons and the dens of wild beasts—becomes a fruitful land, a garden of delight. The

face of the ground being thus changed, the climate also is improved, society is sustained, elevated, and extended, the pastures are clothed with flocks, and the valleys also are covered with corn; they shout for joy, they also sing.

It is pleasing to find our soundest philosophy ascribing to God the dominion of the world. "In the divine order of the universe, each particular event, becoming in its turn the cause of innumerable other events, has its appropriate place and object; and the great mystery of the creation is that every event conspires to advance the progress of the whole."—*Lord Bacon*. In showing the very different facts of creation and providence as being equally of God, the inspired penmen never falter or vary. And who taught them this divine philosophy, but the eternal Spirit, that garnished the heavens and reanimates the decayed powers of this lower world? (Psa. civ. 30.) They never, at any time, in speaking of the works of God, confound the established course of nature, its fixed persistent course and regular phenomena, with its variable and unforeseen occurrences, for that would be to confound the living with the dead. In distinguishing the uniform and constant from the fitful and the temporary, inspired men, it is manifest, are far ahead of theorists, who would place all phenomena, both of the living mind and of insensate matter, in the same category, and then hold them bound together, without distinction, under one immutable and persistent law—a law of which, however, they are compelled to confess they know nothing as yet;

albeit, they expect it will hereafter come to light, and convince mankind that human science can tell better than the oracles of God how the world is governed.

"Geology and astronomy," it has been said, "conspire to inform us that there is a uniformity of law throughout the widest regions of time and space."—

Dr M'Cosh. And what, 'one may ask, does meteorology teach us by the changes and diversities which it never ceases to exhibit? And even astronomy, with all its uniformity, distinctly informs us that while the great orb of day is, in its going forth, a pattern of punctuality and order, it, at the same time, exhibits, by its various states and emanations, a power of adaptation and a susceptibility of change, worthy of the all-wise Creator by whom alone it still shines, with admirably varied influence, "upon the evil and the good."

None of our philosophers has more stoutly denied the being and providence of God than Augustus Comte, yet none has more strongly corroborated the doctrine of scripture; and this is not the less pleasing that "he meant not so." In accordance with revelation, he well shows the very wide difference between the variable and the constant, as displayed, on the one hand, by the solar system, and on the other, by the mutability of aerial phenomena, the uncertainty of meteoric changes. While regarding astronomy as the most perfect of the sciences, "in which man knows most, and most perfectly," he denies meteorology to be a science at all. "The phenomena are so multiform and intricate, so subtle and variable,

as to be irreducible to law and order." And he observes further, however inconsistently, "that the course of nature," in which meteorology must be included, "*is regular and constant*, but the mind of man *capricious*." He accordingly contends that all the certainty that exists is in the regularity of law; and his conclusion is,—there is no God—all is fixed law. Now, who but the omnipotent Creator could be the author of either undeviating regularity and fixed law, or of needful variableness and adjustment—both of which are ever seen in the doings of the living and intelligent, as well as manifest in the great system of the universe? No ingenuity can trace both this undeviating regularity and needful adaptation to one and the same insensate law, or any one fixed antecedent. As to the variable doings of mankind, they assuredly result from the volitions of the mind. "There is a time," saith the wise king of Israel, "to every purpose; a time to plant, and a time to pluck up that which is planted; a time to break down, and a time to build up; a time to cast away stones, and a time to gather stones together; a time to rend, and a time to sew; a time to keep silence, and a time to speak; a time of war, and a time of peace." From mind alone both diversity and order must proceed. And what eye can penetrate the thoughts and intentions of the living mind? "The heaven for height, and the earth for depth, and the heart of the king is unsearchable." "And canst thou by searching find out God? Canst thou find out the Almighty unto perfection? It is high as heaven, what canst thou

do? deeper than hell, what canst thou know? The measure thereof is longer than the earth, and broader than the sea." Nothing has been more observed and studied than the aspect and changes of the sky, of which in all ages certain definite opinions have been formed. And with the exception of certain theorists, and these chiefly of recent times, mankind have from the first agreed to recognize an overruling providence in relation to the seasons and the weather. As to the general belief, Mr Hume remarks, "it is usual to have recourse to some invisible intelligent principle, as the immediate cause of that event, which surprises them, and which they think cannot be accounted for from the common powers of nature." And Sir William Hamilton has since said, "That philosophers have never been able to find any other criterion of truth than the common sense of mankind." The philosophic Kaemtz, however, little sympathizing with these antiquated notions, has facetiously said, "That the people whom the Europeans have discovered in past centuries regarded thunder as the sign of celestial anger, as did the Greeks and Romans. Jupiter Tonans was the greatest of the pagan gods; and in the Bible it is said that thunder is the voice of the angry Lord." This remark is both inaccurate and sceptical. The pagans indeed were more disposed to be dismayed than comforted by their perverted faith, and hence saw dark portents when men, enlightened by the truth, beheld the power and benignity of God, who, not in anger, but in mercy, sent "the lightning for rain." They were accordingly admonished, "Be

not dismayed at the signs of heaven, for the heathen are dismayed at them."

"In the book of God, war, pestilence, and famine are exhibited as the great scourges of God to punish sinful nations. In this light also they have been regarded even by the heathen. Herodotus, the father of history, gives remarkable examples of this opinion, and avers it as his own. It would be an interesting work to select what occurs in the writings of the ancient heathens on this subject, and exhibit it as evidence of Divine Providence."—*Dr Carson.*

Cicero, in his treatise on the nature of the gods, mentions, among other reasons of Cleanthes for believing in their existence, the greatness of the benefits which mankind derive from the seasons, the fruitfulness of the earth, and the abundance of other blessings; and further, because they injected fear into the minds of men by tempests, thunders, storms, clouds, snow, and hail; and also by desolation, pestilence, frequent earthquakes, showers of meteoric stones, falls of rocks and rendings of the earth. Those phenomena he classes with portents which are "contrary to nature," as giving evidence of divine interposal. He thus indeed expresses the opinions of mankind, including their wise men, and such were accounted most knowing and profound.

In this acknowledgment of God all nations still agree. In the east, at the present time, Dr Thomson informs us, "People of every class, faith, and character,

familiarly and constantly ascribe regular and abundant rains, fruitful seasons, and good harvests to the direct agency and interposition of God. This," he says, "has its origin in a deep sense of uncertainty and of entire dependence for their daily bread upon the showers of heaven, delayed every year, until much painful solicitude is felt by all classes. I have seen several instances in which Moslems, Christians, and Jews have united in fasts, processions, and prayers, in the open air, for the showers that water the earth."—*The Land and the Book*, pp. 90, 91.

One occidental scepticism has not infected all men. In the blaze of scriptural and scientific light, many of all classes love to contemplate the admirable mighty works of God. In a public meeting for the circulation of the scriptures, Guizot, who was in the chair, remarked : "Historically, the Old Testament and the gospel contain a fact, a spectacle without a parallel. It is the history, if I may be pardoned such an expression, of God himself, in his relations with souls and human societies. It is the spectacle of our real personal God incessantly present and acting in the world. The Old Testament and the gospel bear an entirely different character from the traditions and monuments of states—it is the presence and action of God, who made man and the world, and who governs them."

The following lines, by a Christian poet, express the mind of the whole church of God :—

“Men grew and multiplied,
But lacked not bread, for God his promise brought
To mind, and blessed the land with plenteous rain,
And made it blessed for dews, and precious things
Of heaven, and blessings of the earth beneath,
And blessings of the sun, and moon, and fruits,
Of day and night, and blessings of the vale,
And precious things of the eternal hills,
And all the fulness of perpetual spring.”

LAWS OF NATURE.

THE term nature comprehends the aggregate of all created things; and, as Lord Bacon remarks, "nothing exists in nature but individual bodies producing pure individual acts." The mode in which these acts are produced—the manner in which substances or beings act, and are acted on by one another—the rule, or *modus operandi*, according to which power operates, is called a law of nature. "The laws of nature," says Dr Reid, "are the rules according to which the effects are produced, but there must be a cause which operates according to these rules. The rules of navigation never navigated a ship, the rules of architecture never built a house." To the same purpose, Paley well remarks, "It is a perversion of language to assign any law as the efficient, operative cause of anything. A law presupposes an agent, for it is only the mode according to which an agent proceeds; it implies a power, for it is the order according to which that power acts. Without this agent, without this power, which are both distinct from itself, the 'law' does nothing, is nothing." No error, then, can be more palpable, nor, in science, more mischievous, as leading distinctly to atheism, than the substitution of the law or mode of operation for the operating agent—the pure indi-

vidual act, or the manner of it, for the being or power whose act it is. Physical energies are not governed by a law that is external to them ; they are a law unto themselves, according to the force and tendencies of those inherent qualities from which the act proceeds. Look at the process of vegetation, and the natural tendencies of the qualities or forces of vegetable bodies as originally constituted by creative wisdom. "And God said, Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself, upon the earth : and it was so." And how wonderful that every seed should contain the embryo lineaments of the future plant, and so unfold the connexion of creation and providence.

"Go, mark the matchless working of the power,
That shuts within the seed the future flower ;
Bids them in elegance of form excel,
In colour these, and those delight the smell ;
Sends nature forth the daughter of the skies,
To dance on earth, and charm all human eyes."

The laws of nature, then, are powerfully written on the works of creation. All the individuals of both the animal and vegetable kingdoms, in virtue of their native energies, and the pabulum provided for them, observe the laws which, as inherent in them, they were destined to fulfil. Herbs and trees grow, bud, and bring forth fruit ; and animals are sustained and propagated without the interposal of any foreign or external law : they are a law unto themselves, and thus show how perfect God made

them. After the creation of our first parents, "God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat." Add to these, the influences of the firmament, and its great enduring lights to rule the day and the night. How admirable, then, are the works of God in their constitution, and how manifest his power in their continuance! "Thou hast established the earth and it abideth. They continue this day according to their ordinances; for they are all thy servants." And how fitly is it said, "And God saw every thing that he had made, and, behold, it was very good."

With respect to power or causation, it is evident God carries on the system of the universe not by laws or abstractions, but by bodies, agencies, and force, which he only could originate and render permanent. We see it so on earth, and believe it to be so in heaven. The vital elements of light, heat, and electricity, and especially the living armies of the universe, are not abstractions or figures of speech, but mighty active agencies. And of greater account surely is the person or the power that operates, than the manner of the operation.

Ambiguity and mysticism not seldom take the place of truth in speculative science, and never more than when all the hosts of heaven, and all the powers of the world are ignored to give place to philosophic phantoms. Now, the term *nature* has been so distinguished from art and mind, as to imply that what

is artificial, mental, or extraordinary, is not to be deemed natural. Roger Bacon speaks of the effects of gunpowder as different from those of nature. He does not, however, use the term *nature* in a sceptical sense. "Noises," he says, "may be made in the air like thunder, nay, with greater horror than those which are of nature ; for a little matter, filled to the quantity of a thimble, makes a horrible noise, and wonderful lightning. And this is done of sundry fashions, whereby any city or army may be destroyed." These effects of gunpowder, though in truth as natural as lightning and thunder, are said not to be of nature, because they require the hand of man to produce them ; as if mankind and their actions were beyond, or above, the pale of nature and its laws. By the ignorant of those days, the effects of gunpowder would be readily attributed to superhuman agency ; for, as what is supernatural to birds, beasts, and fishes, is natural to man, so what is supernatural to man is natural or common to beings of a higher order, as the angels of God. Accordingly, Roger Bacon's discoveries, being, so to speak, preternatural to the monks, whose ignorance ascribed them to magic, or converse with the devil, brought him into ill-savour with those wondering ecclesiastics, as the holy angels now are with philosophers and philosophic theologians.

"How endless," as has been truly remarked, "have been the errors founded on the phenomena of nature—the circumstances of the world. One by one, at long intervals, after infinite bungling, are the

truths of nature—what are called her laws—discovered.” Now, as the term nature is often used ambiguously, so the phrase, the laws of nature, as frequently employed, is calculated to mislead. Is not this the effect of the very common practice of applying it, almost exclusively, to the reciprocal action of *material* substances? “All the laws of nature, and all the operations of bodies,” says Hume, “are known only by experience.” Having no reliance on the operation of God, which he denies, and no experience of the agency of angels, which he does not recognise, he must be supposed here to restrict *the laws of nature* to the universe of matter, and the mutual actions of its parts. Yet, in another place, our philosopher speaks of the laws of mind as being as truly laws of nature as those of inert substances. And while he draws his famous, yet most silly, argument against miracles, from the uniform procedure of the laws of matter, as if these only were laws of nature, he nevertheless remarks that, by the laws of nature, “Mind acts on matter, matter upon mind, and spirit upon spirit.” “Is there,” he asks, “any principle in all nature more incomprehensible than the union of mind and body—the most refined thought actuating the grossest matter? Were we empowered by a secret wish to remove mountains, or control the planets in their orbits, this extensive authority would not be more extraordinary, nor more beyond our comprehension.” Again he says,—“Nothing can be more incomprehensible than the way in which body should operate on mind.” Thus

does our philosopher carry up the power of mind, together with the laws of nature, to nature's God—thence extending those laws to the operation of God himself, and to all the living agencies he may be pleased to employ. Wherefore, by the doctrine of Hume himself, a very great miracle may be no violation of the laws of nature, but merely “the most refined thought actuating the grossest matter,” or “spirit acting on spirit,”—the greater on the less—the stronger on the weaker; for this, as he distinctly shows, belongs to the system of nature, and the operation of her laws.

Doubtless, the most extraordinary and surprising view is given of physical and insensate law, when it is made to supplant the ever-wakeful government of God, and is described as producing, regulating, and sustaining the entire system of the universe. The Gentiles made gods to whom, as supposed alive, they jointly and severally assigned the dominion of the world. The Roman Cæsars, after death, were placed among the gods; and, since their time, so-called saints have been formally canonised, invoked, and trusted as semi-divine patrons and benefactors. And has not our science gone further in extravagance, by transforming the laws or processes of nature into paramount, creative, and sustaining entities, which is to make them gods, “which by nature are no gods?” “But,” as has been well remarked, “for the existence of this phantom LAW, irrespective of a divine legislator, no one has yet attempted to account. Its propounders are con-

tented with knowing nothing ! *The very conception of origin being too great for them.* And this is the return they offer in exchange for giving up all we know, and all that we conceive we know."—*Creation's Testimony to its God, by Thomas Ragg.*

Now, as to the *laws of nature*, of which phrase we are compelled to make so frequent use, it being in general equivalent to the course of nature, and those laws denoting neither substances nor their qualities, but only the modes in which these act and are acted on—laws of nature are in truth but figures of speech, mere abstractions—and they are therefore, as the apostle saith of the idols of the heathen, "nothing in the world." It adds nothing to our knowledge to be told that water freezes, or is converted into vapour, *by a law of nature*; or that, in accordance with *a law of nature*, our life is sustained by the food we eat and the air we breathe. All operations and phenomena are equally intelligible, whether this phrase is used or not. Agriculturists, artizans, house-keepers, and even our philosophers, can speak of the uses and properties of things without any mention of *the laws of nature*. You will not, then, wonder if this phrase is never used by Moses, though learned in all the wisdom of the Egyptians; nor by Job, though eminently versed in all the wisdom of the East; nor yet by Solomon, the wise king of Israel, notwithstanding his large and accurate survey and unrivalled understanding of all the works of God. The ambiguous and varied application of the terms *nature* and *laws*, on which some would suspend, as on

pegs, the system of the universe, show how entirely they would separate the world and mankind from the throne of the Eternal. Yet, to the proper application of the phrase "laws of nature" to physical phenomena and operations, we do not at all object. Laws among men are enacted by "the powers that be." An apostle uses the phrases "the law of sin and death," to denote the reigning power of sin and death; and "the law of the spirit of life in Christ Jesus," to express the life-giving efficacy of the doctrine of Christ through the operation of the Holy Spirit. The *laws of nature*, then, may imply not only the action of physical substances on one another, but the energy and operation of all living natures, not excepting the operation of God, who is to all creatures the only source of whatever power they possess. God and his creatures work according to the nature of things. He surely has not enacted laws subversive of his own native right to rule. A mechanist constructing a machine, the working of which he should himself afterwards conduct, would make it as perfect as possible, so as to be capable of being guided with the least possible expense and trouble. In governing the world, God uses the energies which, in his wisdom, he imparted to matter and to life. In creating all things, he had an eye to their future government, and accordingly adapted their energies to his own divine power, as well as to the nature of man. And for whom is it so easy to interpose as for the omnipotent and omnipresent God? "God," say some, "does not need to interpose," as if his doing so were a trouble to him—

something foreign to his office—a meddling with things not belonging to him. Is this to know the Almighty? Is this to honour him as “the only wise God,” who is ever present, omniscient, and sovereign? The worshippers on high “fall down before the throne, saying, Thou hast created all things, and for thy pleasure they are and were created.”

Now, there being in the universe two distinct and very different substances or natures, the spiritual and the material, there must of necessity be two orders of agencies, two codes of laws, and consequently two classes of phenomena, the mental and the physical. Why should God be supposed to act contrary to the nature of either? or why should any created being be supposed capable of at all changing the nature of anything, or setting aside its laws? Yet in creation, as in society, there are subordinate forces, the operation of which is subsidiary to others which are of a higher order: the weaker must yield to the strong, and the greater rule the less. Spiritual nature is higher and mightier than brute force. A living man can stop a rolling stone, or turn the course of a streamlet or a river; and an angel can illuminate a prison, and cause the fetters of the prisoner to fall from his body, and the iron gate to open of its own accord,—not by trespassing the laws of nature, but by fulfilling them.

Natural laws are, with reason, regarded as being fixed, uniform, persistent. “That which is most remarkable about them is their unchangeableness. Every law is, in its own nature, invariable, producing

always, under the same conditions, precisely and necessarily the same effects. The whole mind and imagination of scientific men is often so impressed with this character of material laws, that no room is left for the perception of other aspects of their nature and their work. We hear of rigid and universal sequence—necessary, invariable ; of unbroken cause and effect, no link in which can, in the nature of things, be ever broken. And this idea grows upon the mind, until, in some confused manner, it is held as casting out the idea of purpose in creation, and inconsistent with the element of will.”—*Duke of Argyll, in Good Words, Jan., 1865.*

But mind and will still assert their right to rule, and cease not to display their native power and supremacy. They cannot, therefore, be excluded from our contemplation of the works of God. “Human knowledge,” says Reid, “relates to things material and things intellectual. These are the two great kingdoms of nature that fall within our notice, and about the one or the other, or things pertaining to them, every art, every science, every human thought is employed ; nor can the boldest flight of imagination carry us beyond their limits. Body and mind are the only beings of which we can have any knowledge, or can form any conception. There appears to be a great interval between them. Whether there be any intermediate nature that connects them together we know not.”

Dr M'Cosh divides the laws of nature in relation to “things material” into two classes—regular and

cross laws. But in furnishing illustrations of the latter, on which, as he well shows, we are most dependent, he unavoidably refers to those phenomena which the Bible and the common sense of mankind attribute not to blind insensate law, but to the operation of God, either by his own power, or by the ministry of living agents. And how large a portion of the word of God is designed to teach men, in the most explicit manner, that God both employs living agencies of diverse kind; and also, according to his own unerring wisdom, regulates the seasons of the year, the changes of the weather, and the springing of the earth, and, in a word, the entire course of things, comprising not only the interests of mankind, but the preservation of all the tribes of being.

Now, there being two natures, the intellectual and the material, which divide the universe between them, there are also two classes of phenomena, which, though altogether different, like soul and body, are constituted jointly to fulfil the purposes of God. Hence, it is evident that all theories of a divine government which would leave out intelligence and living agency, or subordinate their higher natures to dead matter, and so consign the universe to insensate laws, are fit only for the regions of the dead. The mind being above matter, has powers, and, consequently, laws of its own, and these suited to its intellectual and moral character. The mind, however, though incomparably the more excellent, is dependent upon God. Its knowledge, strength, and happiness, in its best estate, are the gifts of heaven. And when sinful man is by

grace restored to "newness of life," he walks by faith in God, and has boldness, through the Saviour's intercession, to solicit mercy and "seek grace to help him in the time of need."

The holy angels are guided by the principles of truth and goodness, which are the laws of their sinless nature. "Mighty in strength," they hearken to the voice of God, and obey it. They are not in subjection to material laws; neither were the prophets and apostles in their spiritual functions. And the Holy Spirit, by whom they were illuminated, adapted his operation to their faculties of mind and body, and their duty to the people whom they laboured to instruct. Nay, heathen sages accorded to their gods the prerogative to influence the counsels of mankind. And how manifold the efforts of the human mind in the dispensations of an overruling providence. Much more, surely, should the counsel and the power of the Lord of all be acknowledged. As, however, to the laws of nature, the wildest violations of them are proposed by the hypothesis which would subject the doings of all living agents—and even the administration of God himself—to the force of blind, insensate matter. When his "understanding returned" to the haughty king of Babylon, how reasonably and how justly did he learn to speak of God. "I blessed the most High, and honoured him that liveth for ever, whose dominion is an everlasting dominion, and his kingdom is from generation to generation: and all the inhabitants of the earth are reputed as nothing: and he doeth according to his will in the army of heaven, and

among the inhabitants of the earth : and none can stay his hand, or say to him, What doest thou ?”

Now, since no laws of nature are violated by the ministry of angels, nor by the highest inspiration of prophets and apostles, nor when the seeing lead the blind, the strong support the weak, and the living animate the dying and the faint, why should they be supposed suspended or “transgressed,” when material substances are made to yield to the intelligence and might of the infinite Creator, or the ministers appointed by him ? Material forces yield to one another, and still more signally to the power and the guidance of all living natures—the very least and feeblest of which has unquestionable power over inert substances. No finite being, however high, can either create or change the properties of matter : God himself does not change them in governing the world—he employs and directs them : this consists with the eternal immutability and infinite perfection of his nature, “of whom, and through whom, and to whom are all things.” It was truly said by the wise king of Israel : “I know that whatsoever God doeth, it shall be for ever ; nothing can be put to it, nor anything taken from it : and God doeth it, that men should fear before him. That which hath been, is now ; and that which is to be, hath already been ; and God requireth that which is past.”

ULTIMATE LAW.

As the phrase, "a law of nature," is used to signify force or power, so an ultimate, supreme law is made to take the place of the great Author of all power and all order. "Not many years have elapsed," Mr Morrell remarks, "since M. Comte attempted to persuade mankind that the glorious universe which we inhabit has come into being by the spontaneous working of some abstract law." Now, an abstract law can exist only in the philosopher's imagination. The actual energies and operations of the world are *not* abstract but concrete—all resulting from the properties of matter. "No separation can be made between the properties of nature and her laws, except mentally." Can you find the law of gravitation in the absence of gravitating matter? or the laws of attraction and cohesion where there are no substances to attract and cohere? The qualities and energies of the concrete mass can alone exhibit any law of nature. Can, then, any notion be more groundless than an abstract law to create the world, and be the cause of all its various phenomena? Albeit, "the dream of the philosophers, that all phenomena are but variations of one universal principle, is the dictum of modern science in its most advanced conclusions."

But that the same power which created the world

is still required to govern and sustain it, is the general belief of mankind. Some, however, have, in more recent times, advanced another theory, which, indeed, admits that God created the world, but at the same time denies that its government is in the hand of God. Hume thus states his view of the matter. "It argues more wisdom to contrive at first the fabric of the world with such perfect foresight that, of itself, and by its own proper operation, it may serve all the purposes of providence, than if the great Creator were obliged every moment to adjust its parts, and animate every moment by his breath all the wheels of the stupendous machine." While admitting the creation of the world by the wisdom of God, this philosopher commits its government to "its own proper operation," or, what he elsewhere calls, "the blind, insensate force of nature," and not to the energy and care of the great Creator. And he remarks, moreover, "This theory of the universal energy, and operation of the supreme being, is too bold ever to carry conviction with it to a man sufficiently apprised of the weakness of human reason, and the narrow limits to which it is confined in all its operations." Yet, strangely enough, with all this well-expressed diffidence and distrust of the strength and grasp of human reason, he himself constructs a bolder theory when he commits to the "blind, insensate force of nature," a machine which, even in the hand that made it, "would require its parts adjusted, and its wheels animated every moment." Now, only consider this:

the machine, left to itself, will work admirably, but, directed by its maker, its parts become disordered, and its wheels unserviceable. This is surely "science falsely so-called."

"Some say, that in the origin of things,
When all creation started into birth,
The infant elements received a law
From which they swerve not since. That under force
Of that controlling ordinance they move,
And need not his immediate hand, who first
Prescribed their course, to regulate it now.
But how should matter occupy a charge,
Dull as it is, and satisfy a law
So vast in its demands, unless impell'd
To ceaseless service by a ceaseless force,
And under pressure of some conscious cause?
The Lord of all, himself through all diffused,
Sustains, and is the life of all that lives.
Nature is but a name for an effect,
Whose cause is God.

The atheism with which Hume has been charged, is not a denial of God as the Creator of the world, but the denial of the providence of God. He distinctly declares that "the primal cause of every operation—the cause of causes," is the fiat of the Creator. And if the heart of this philosopher had not been so violently hostile to the revealed character of God, he would have been among the first to see the utter fallacy of his own one-sided, gratuitous hypothesis.

In the speculations of our natural philosophers, the great desideratum is a primordial comprehensive law—a powerful vicegerency, omnipotent, omnipre-

sent, invariable and persistent, whence all other laws have originated, and by which they are directed and controlled. But such a law is, with reason, regarded as a chimera. "No philosopher," even Hume remarks, "has ever pretended to assign an ultimate cause of natural operations." Yet such a cause, though utterly unknown, is supposed to exist, and a hope is entertained of its being brought to light; and who could calculate its value to our material philosophy? for, as an omnipotent and vivifying power, it would conduct a universal government in which God should have no concern.

"Laplace used the history of gravitation as an argument for banishing God from his works. In his estimation, the theory was so satisfactory in accounting for all phenomena, that the idea of God was superfluous." Sir Isaac Newton, who was far from vaunting his great scientific knowledge, or turning it against revelation, "had recourse to an ethereal active fluid to explain his universal attraction."

The ingenious author of the "Ninth Bridgewater Treatise," going far back in time, remarks as follows:—"To have foreseen, at the creation of matter and mind, that a period would arrive when nature would become susceptible of the support of vegetable forms; that these should in due time supply the pabulum of universal existence; that successive races of giant forms, or microscopic beings, should at appointed periods necessarily rise into existence, and as inevitably yield to decay; that the extinction of every race should be as certain as the death of each

individual, and the advancement of new genera as inevitable as the destruction of their predecessors ; to have foreseen all these changes, and to have provided by *one comprehensive law for all that should ever occur*, either to the races themselves, to the individuals of which they are composed, or to the globe which they inhabit, manifests a degree of power and knowledge of a far higher order, &c." He thus expresses his estimation of the assumed comprehensive law : "The minutest changes, as well as those transactions apparently the most abrupt, have been, throughout all time, the necessary, the inevitable consequence of some more comprehensive law, impressed on matter at the dawn of its existence."

The philosophy of heathenism, though degenerate and blind, did not so entirely depart from truth, and the recognition of divine power, as our modern material philosophy. Yet even it "turned the truth of God into a lie, and worshipped and served the creature more than the Creator."

"Him blind antiquity profaned, not served,
With self-taught rites, and under various names,
Female and male, Pomona, Pales, Pan,
And Flora and Vertumnus, peopling earth
With tutelary goddesses and gods,
That were not ; and commending as they would,
To each some province, garden, field, or grove."

Thus did the darkened light of heathenism place God "afar off," but, in filling up the interval, it provided living agents as appointed by him to con-

duct the system of the universe. "According to the heathen philosophy, the fulness of the godhead consisted of the inferior local deities, who, they imagined, presided over the particular parts of nature. And the Gnostics, and other ancient heretics, affirmed that these were *Æons*, or eternal beings, who descended from God by various generations, to whom they gave different names and offices." —*Macknight*.

The Hindoo philosophy of the present day, being derived from ancient times, still ascribes dominion and supremacy to *living natures*, not to the laws and sequences of lifeless matter. And no system of government by insensate laws, hitherto propounded by our occidental theorists, is worthy to be compared with the sublime creations of the Hindoo mind. The Hindoos believe that the type of the world, and all that it contains, was originally formed in the mind of Brumah, and that, in accordance with this primordial pattern, the elements, and all phenomena, together with all beings and their actions, sin, and its punishment, virtue and its reward, all happiness and suffering, and every metamorphosis through all the heavens and the hells of their system, all issued from the primordial type as conceived by Brumah. And they, moreover, affirm, that when all moral and physical elements shall have passed through their appointed changes, and are perfectly balanced and adjusted, they will again return into Brumah's bosom. Hence a Hindoo regards himself as nothing, and as not being in any sense a moral accountable

person, but a mere organ of the deity, who speaks, walks, and acts by him.

This system, no doubt, suits a guilty mind, as it tends effectually to relieve it of the painful apprehension of a judgment to come, and all sense of demerit and responsibility; in which respect it harmonises with some occidental systems, which assign as a reason for preferring a law-created world to the operation of one living and eternal God, that thereby sin ceases to be sin and man responsible. By this impious and blind doctrine, the power of conscience, which is at best defective and defiled by sin, is essentially enfeebled, and hence men, prone to evil, are led to sin without restraint, "having their conscience seared with a hot iron."

The hypothesis that would wrest the government of the world from the hand of God, and commit it to the keeping of insensate law, is justly counted atheistical: pushed a little further, it denies God as the author of creation. As remarked, however, by our most able thinkers, power is not resident in physical sequences, but in the will of a free and independent mind. He who created the world by his might, sustains it by a continuance of the act of creation, which is constantly renewing the decays of nature. Permanent phenomena and persistent law declare the power of God as the Creator. "He spake and it was done, he commanded and it stood fast." And what is occasional, intermittent, variable, unmistakably indicates his presiding care, as the God of providence and the Judge of all the earth. If God

does not adjust and guide the elements, they must adjust and guide themselves, or be governed by some agency greater than themselves. Our own experience of things without life may well assure us of the total unfitness of passive inert matter to govern living natures, or to be vaunted as the cause of causes.

Dr M'Cosh, while strongly advocating the dominion of physical law, admits the power of living agency as an ultimate cause. Beyond angelic strength he thinks it would be idle to search for any different or any higher cause. And if the agency of angels is an ultimate cause, so doubtless is the agency of man, and indeed of every living creature—for all living creatures operate on inert matter, and to some extent direct its course. And a chain of sequences, how extended soever, must be traced to the hand that holds the first link. Impressions have been made on the world, and sequences produced, which could not have resulted from physical force. Mental energy has left results and erected monuments of its own peculiar and surpassing efficacy, which cannot be mistaken. Mind, by which physical sequences are originated, is manifestly an ultimate power to which God from the beginning of the world has, relative to lifeless matter, assigned supreme dominion. The effects of human agency, in which mind is paramount, have oftentimes been greater than some of the works which were done by angels. The fire in which the angel ascended in the presence of Manoah, and the light which filled the prison in which Peter was asleep between two quaternions of soldiers, did not

equal in magnitude the burning of Rome by Nero, the conflagration of Moscow, or the great fire of London. And both human and angelic agency, it is evident, are alike conformable to the course of nature and the government of God.

Nay, the highest angel, the most consummate human genius, and the smallest insect are, as living agents, on an equal footing as effective causes, though of unequal power. To the working of all these, in their respective spheres we trace the origin of physical sequences, which, but for their agency, could never have resulted from things without life, or any possible process of insensate substances. In respect of power, the feeblest living thing approaches immeasurably nearer to the greatest genius or the strongest angel, than the highest angel to the great and mighty God by whom it was created. Neither man nor angel can create anything; but both can effect such changes, often sudden and wonderful, as are consistent with the nature of created things,—and how frequently is this superiority to inert substances admirably shown by the most minute and feeble insect tribes? It is not, then, true that all physical phenomena result from uniform insensate law. The acts of all living creatures, in their respective spheres, break the uniformity of nature, and exhibit new antecedents, to be followed by new consequences. The growth of last year is, according to the constitution of the world, to be, by the will of man, the increase of the next. The crop corresponds to the seed sown, whether it be wheat, barley, or any other grain, which must be

according to the pleasure of the husbandman, and not as the result of physical impressions made when the world was created. Thus all God's creatures—angels in heaven, men upon the earth, and all orders of being in their places—are ceaselessly effecting new phenomena and changes; in no instance in violation of law, but, on the contrary, in strict conformity with the nature of things.

All antecedents, it is observed, exist as phenomena; and why should this exclude mind and its properties of life and action? Is not the mind a more extraordinary phenomenon than the body? Do not living power and mental phenomena excel those of matter? Even in the material creation, except for the vital elements which descend from the great source of light and heat, there would be no new phenomena, and no sequences in the earth or sea. Why, then, doubt the high order of mental antecedents? Men may deny their own existence and the being of the everlasting God; still the tree is known by its fruit, and men by their doings, and "God is known by the judgments which he executes."

THE SUPREMACY OF LIVING NATURES.

MIND and matter are the only known substances in the universe. Of the essence of either we have no knowledge. The nature of each is indicated by its qualities. A living soul is an intelligent and active being : matter is altogether senseless, passive, and inert ; by itself no material substance is capable of motion or effort. The living mind, on the contrary, can of itself, without any foreign aid, think, reason, contrive, execute,—it is the seat of consciousness, love, joy, peace, hope, strength, fidelity, and goodness. How noble, then, is the living and immortal part of man ! It not only holds the world and all that relates to it in its comprehensive grasp, but, soaring above all created limits, ascends to God himself, and rejoices in the infallible glory of his infinite perfection.

Angels, being spirits, derive no aid from bodies, on which they, notwithstanding, act with marvellous effect. And the mind of man is like the angels, a spiritual, living substance, being formed after the image of God, not only with power and intelligence, but what is far more excellent, with the divine qualities of true wisdom, justice, and goodness. Being perfect and complete, its only dependence is on God himself. After the body of the first parent was formed of the dust of the ground, it lay inert and

motionless till animated by the breath of God. Man then became "a living soul"—an intelligent and living moral agent—an image of his glorious Creator, and consequently capable of dominion over all the creatures which the Lord God had made. How evidently, then, do living, intelligent beings surpass inert, passive substances! And by how much the properties of matter are inferior to those of intelligence and life, by so much is matter fitted to display the transcendent excellence and power of the living mind. What conceptions of the great and blessed God do we derive from the contemplation of his mighty works in the material creation! The multitude of shining orbs which revolve and glitter in the firmament, are but the clay by which their maker makes his power and his glory manifest. And who would compare the sluggish inert clay to the living and almighty Maker of the heavens and the earth? We cannot identify our own spirits with any form of lifeless matter. I cannot believe the chair on which I sit, or the pen I hold in my hand, equal to my soul, that thinks, wills, rejoices, hopes within me. How, then, can I ascribe to the lifeless fabric of the world and its material, subjective phenomena, the attributes and doings of the living God? "To whom, then, will ye liken God? or what likeness will ye compare to him? Have ye not known, have ye not heard? It is he that sitteth upon the circle of the earth, and the inhabitants thereof are as grasshoppers; that stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in."

It is evident to all, except the votaries of a spurious philosophy, that the confounding of light and darkness, truth and falsehood, right and wrong, is not a more egregious perversion of human reason than the confounding of mind and matter and their respective attributes. "So far from philosophy," it has been well remarked, "leading us to the conclusion that life, vitality, is electricity, every step of our inquiry shows us that the physical force is infinitely inferior to that mysterious principle which human science cannot reach. Vital force, in its lowest development, is infinitely superior to electricity in its highest manifestations."—*British Quarterly*.

"The deification of matter, which is the basis of idolatry," is still held fast by the votaries of superstition, both heathen and Christian, who pray to lifeless forms, and confide in rotten relics, which they moreover honour with temples, gifts, and priestly services. Yet the testimony of their senses could have told them that the objects of their adoration are things without life, which "can neither see, nor hear, nor walk."

"All rational orders," it has been strangely said, "are made to commence their course under the condition of animal organization." "Corporeal existence is the basis of intelligence, activity, or moral agency, and of commerce or sociability among intelligent orders." Now, in reference to angels, this is simply untrue, and it is palpably opposed to the sacred record of the creation of our race. Adam's body, though perfect as a material organism, did not possess

a particle of energy or any principle of life, and what it did not possess it could neither exert nor communicate. "*The Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.* In these words we have a distinct announcement that life and mind did not manifest themselves, as the organization of the body proceeds; but that vitality and intelligence were superadded in connection with a separate existence directly imparted from Jehovah, and therefore in immediate relation with him."—*Doctor More.* While both the body and the spirit are intimately united, and powerfully aid each other, they nevertheless continue fundamentally distinct in their qualities and functions. They, indeed, are as different from one another as the Creator from his works, and they are accordingly so distinguished by God himself in the striking language of Isaiah: "Now the Egyptians are men, and not God; and their horses flesh, and not spirit. When the Lord shall stretch out his hand, both he that helpeth shall fall, and he that is holpen shall fall down, and they all shall fail together." The activity and happiness of the spirits of just men made perfect till the resurrection in the paradise of God, not less than angelic life and strength, afford a delightful demonstration of the existence of spiritual natures independently of bodily organization.

To the philosophy which makes spiritual life dependent on material organism, we owe the absurd hypothesis which ascribes to some unknown law of

nature—some process of the inanimate creation—the existence of men of distinguished genius and talents. “Of the various mysteries,” it has been gravely said, “that the human mind can contemplate, none is more baffling, and, at the same time, more charming, to the understanding than the nature of *that law* that determines the differences of power and mental manifestation between age and age.” This is very baffling to the understanding certainly, and if so, in what respect is it charming? How the understanding of any man can so approach the unintelligible mystery as to be charmed by it, is to us incomprehensible.

On this subject, one who is himself distinguished by great and important services to mankind has said: “Let me ask you at whose bidding do the men of destiny appear? Are they, as we are told by a certain class of philosophers, are they the products of a fortuitous concourse of blind atoms, impelled to and fro by a fatality as blind as themselves? or are we to believe there is a Providence who interposes directly in the regulation of human affairs, and that the philosophy is false which tells us that he has gone up from us to the farthest ends of the heavens, and has left off doing marvellously among the men of the latter days?”—*Speech of Lord Elgin.*

The hypothesis which makes the living soul dependent on the earthly tenement, accords not with the contemplations of such men as Bacon and Pascal. “I believe,” says Bacon, “that at the first the soul of man was not produced by heaven or earth, but was breathed immediately from God, so that the

ways and proceedings of God with spirits are not included in nature ; that is, in the laws of heaven and earth, but are reserved to the law of his secret will and grace." "All sects," says Pascal, "of philosophers are wont to exhibit confusion in their ideas, and speak indiscriminately of spiritual and corporeal things. They boldly assert that bodies have a tendency to fall, that they gravitate towards the centre, that they shrink from destruction, fear a vacuum, and possess inclinations, sympathies, antipathies—all which are proper to spirit only. Instead of imbibing pure ideas of these things, we tinge them with our own qualities, and impress all the objects of our contemplation with characters of our own complex being. Who would not suppose, seeing we mingle the ideas of spirit and matter in all things, that this combination would be to us easy of comprehension. Yet it is the thing of all others that we understand least. Man is himself the greatest marvel in nature. He is incapable of conceiving what is body, and still less what is spirit, and less than either the one or the other can he comprehend the nature of the union between the body and the spirit. There is the climax of his difficulties, and yet this is his own state of being."

The adaptation to each other of the soul and body is no proof that the one is produced, or is essentially moulded by the other. All the tribes of animals were created complete, with all their faculties and instincts. But man's body and spirit were formed separately, and afterwards united. And it will again

be seen in the resurrection, at the coming of the Lord, how different both are, and yet how admirably fitted to complete the complex being, man ; who, as saved from sin, and made by grace partaker of a new and holy character, is destined to remain for evermore a monument of the wisdom, love, and power of his God and Saviour. Such is the deliverance, and such is the hope made known in the gospel !

The supreme law of the universe is the dominion of mind over matter. In the work of creation, and no less in its government, we behold not merely the dominion of mind, but its infinite superiority. In the wisdom, and design, and adaptation of created things—in the power and munificence impressed on them—in the surprising variety and exquisite symmetry of organised beings—the supremacy of God, and the inconceivable grandeur of his nature, are incontestably demonstrated.

The superiority of mind in general, and its dominion in the works of God, could not have escaped the observation of mankind in any age or country. This great fact has irresistibly fixed itself on the mind of the most enlightened and profound thinkers. “There can be no wider interval,” observes a distinguished writer in philosophy, “than the separation which must exist between the laws of mechanical force, and motives, and volitions of free moral action.”—*Whewell*.

It is, then, arbitrary to include the laws of mind and those of matter in the same category, and to regard both as links in the same unbroken chain of

natural sequences. But if, because mankind have bodies, you include their spirits in the same category, you must link the angels also with the elements of matter on which, we know, they powerfully act. Nay, the operation of the Holy Spirit on man, which is altogether divine as well as preternatural, will thus be included in the sequences of nature. But, even as God is above the works which he has made, and the angels also are higher than insensate matter, so man, formed after the image of God, stands as the lord of the world he inhabits.

“We are taught that man cannot create, but that he is gifted with powers by which he can employ everything that is created; that he may almost mould the original kingdoms to his will, that he may fashion the inorganic to his desire, employ alike the grossest and the most subtile forms of matter, and bring under his control the vast phenomena which appear to link the earthly with the spiritual. Thus we see the great power of nature chained in obedience to the human will, and compelled to do the biddings of humanity.”—*British Quarterly*, August, 1853.

“It was an ancient opinion, to which philosophy also inclines, that motion, in every case, is the product of mind, and that, though continued and transmitted through various means, it never commences, except in a volition either of the supreme mind or of a created mind. This doctrine may well have been suggested by our own consciousness, with which it exactly comports. The mere volition is followed by muscular action, and the process is absolutely

simple and instantaneous. The mind impels matter with the celerity of lightning, and with a force that is bounded, as it seems, by the strength of the instrument it employs.”—*Isaac Taylor*.

Now, to say nothing of the power of the human mind, and its operations on the government of God, or of those mighty spirits who are the ministers of God in both the worlds of nature and of grace, let us look at the faculties and doings of the lowest tribes of being. How incessant their activity, how manifold their labours! In how many instances were insect tribes employed to chastise the wicked! “The palmer-worm, the caterpillar, and the locust”—“my great army,” as Jehovah calls them—humbled the spirits of the proud, and taught them to remember God as alone the ruler and possessor of the earth. In France, insect tribes have been computed to have destroyed of the crop the value of many millions sterling in one season. On the other hand, in how many instances do the feeble tribes of being contribute to our comfort? The products of the bee, though already great, are capable of being still increased to an indefinite extent. The labour of the silk-worm has essentially contributed to the commerce of the world. How many does it furnish with their richest attire! The fowls of heaven rid the earth of many noxious substances, including countless tribes of insects, grubs, and reptiles, all of which would otherwise pollute the air and destroy the earth. And the microscope brings to light unnumbered myriads which were before unknown. “In the leaf, in the bud, in

solids and in fluids, animals existed hitherto unsuspected. The apparently dead masses and blank spaces of the world were found to swarm with life. Their structure, their vessels, and their limbs, their adaptation to their situation, their food and habitations, were regulated in as beautiful and complete a manner as those of the largest and apparently most favoured animals. The smallest insects are as exactly finished, often as gaily ornamented, as the most graceful beast or bird of brightest plumage."—*Whewell*. Of those exceedingly minute living agents Mr Ragg remarks: "There are beings, endued with perfect organs of nutrition, locomotion, and reproduction, a million of which would not exceed one grain of sand, eight millions of which might be comprised in a grain of mustard seed."

Now, as organised living creatures, they are capable of labour. In relation to the molecules of the earth, their organs are powerful to originate new sequences and to form new tissues. Hence, in holding possession of the surface of the earth and its productions, their labour must essentially affect the system of the world. They, indeed, approach the infinitely small, but they are far from reaching it. Nor does their distance from our power of observation affect their value and importance in the system of the world and their own sphere of action. The perfection which comprises the minutest atoms, requires the labours of those least of living agents. And if such inconceivably minute beings are formed with perfect organs for necessary uses, what importance ought we to

assign to the superhuman ministry of the most intelligent and mighty of created natures! And all life, it is evident, whether insect or angelic, indicates the mind and plan of the Creator relative to living power. Numbers without number, from the least to the greatest, are continually severing physical relationships and effecting new combinations, new phenomena, and new sequences. Who can show a boundary where living tribes become unnecessary? Who can say of any order of organised and animated beings, that they existed to no purpose? The least of them are too beautiful and perfect to have been made in vain, or to be accounted useless. They must be supposed as necessary in their own place as the largest animals in theirs. "Optics have revealed the existence of animalcula, more numerous and more influential on the health of plants and men than all the animals visible to the naked eye."—*Henry Drummond*. Here, as in the human body, the more feeble organs, which are the vital, are more necessary than the strongest. Those least of living things effect decompositions and form new combinations which, but for them, could never have been effected by any physical law. To them, therefore, the world is indebted for unceasing benefits. Indeed, adoring wonder, the most rational and just, may well arise from the contemplation of the faculties and doings of the insect tribes!

"Yon insect on the wall,
Which moves this way and that its hundred limbs,
Were it a toy of mere mechanic craft
It were an infinitely curious thing!

But it has life, Ordonio, life and enjoyment!
And by the power of its miraculous will
Wields all the complex movements of its frame
Unerringly to pleasurable ends!"

But however beneficial the labour of the merely animal and insect tribes may be accounted, it holds but a low place as compared to the skill and labour of mankind. And when, in a time to come, the nations shall have been enlightened and made free, will not this connect their labour with the grace and power of the living God, "of whom, and through whom, and to whom are all things?" Nor have we even already to go far for proof of the surprising elevation, by the power of the gospel of the grace of God, of degraded fellow creatures, from savage *ignorance* and cruelty to high intelligence and moral worth. Even such benighted men as adorned their bodies with the entrails of beasts, and fed on the vilest creeping things, are now, we rejoice to know, enlightened worshippers of God, and, as members of society, expert artificers, architects, and husbandmen, having schools, literature, laws, and patriotic institutions, together with the comforts and decencies of Christian civilization. Cannibals and devil-worshippers are transformed into benefactors. In how many heathen lands, especially Africa and the South Sea Islands, have sprung up and blossomed such noble "trees of righteousness," "the planting of the Lord, that he should be glorified."

When the inhabitants of the world are delivered from the dreadful scourge of war, the iron sceptre of

despotic rulers, and the deadly plague of human priestcraft, and its malaria of debasing superstition, and are blessed with useful knowledge, benevolent institutions, and equitable laws; and when their number is, moreover, exceedingly augmented, how surely and speedily will they change the aspect of the earth from dreariness and barrenness to fertility and beauty! Prowling savages, armies of civilised destroyers, "brutish men, skilful to destroy," squalid and vicious dwellers in foul lanes and sunless dens, will become productive labourers and honourable citizens. Deserts, jungles, marshes, forests, will be turned to fruitful fields and gardens of delight. And who can estimate the influence of a thorough cultivation of the soil over all the earth in purifying the air, improving the climates of the world, and promoting the health and welfare of its inhabitants?

None can more readily conceive of all this than scientific students, for they best understand both the limits and the force of the powers of the inanimate creation. Believers in divine revelation and its animating promises, look for mighty moral changes, and consequent physical and social improvements, in ages soon to follow. To secure these most desirable results, nothing more is required than the prevalence of the religion of the Bible, and its necessary fruit of intelligence, energy, justice, freedom, and benevolence.

As to the force of nature and man's dominion over it, it has been justly and well remarked: "God has not put us before nature to make us only its pupil, but also its master. We are not only to look up and

take, but to look down and control and to rule. The whole talk about the absolute and inflexible government of natural laws has no foundation except in fools' brains. It is a divided empire, and man's part is more than nature's. When God made man, he made more of nature in him than he did in all the rest of the world."—*Henry Ward Beecher*.

Perhaps no proof of the indispensable supremacy of living natures, is more convincing or satisfactory than the fact of man's positive dependence on his own skill and labour for the means of his subsistence ; while all other tribes of being are sufficiently fed by what nature alone supplies. From a valuable paper on this interesting subject, by Professor Harvey, in *Good Words*, September, 1861, we transcribe the observations following :— " The cerealia, which comprise wheat, rye, barley, oats, maize, rice, and millet, are beyond all doubt man's proper food. Without corn, living on wild roots, or by hunting or fishing, and precariously, or from hand to mouth, man is every where a savage and a cannibal, improvident, bestial, incapable of taking a single step towards a higher or better condition. Yet, in respect of that which cometh upon him daily, nature, on the one hand, has in a great measure left him out of her reckoning, while, on the other, God has, in an especial manner, been 'mindful of' and has 'visited' him. Had not God specially created the cerealia, nature would never have produced them. Had God not said to man, 'Behold, to you I have given them for meat,' man would never have *discovered*, while

yet he had them, their use as food. Had not God sent forth man to till the ground, there would at this present be no corn in the world. Unknown—not growing any where as wild plants, or as mere grasses—they grow no where spontaneously, or of their own accord. Left to themselves they die out, disappear, become extinct. Man, indeed, may degrade them—he can reduce them to the condition of a perfectly natural, yet absolutely worthless grass. Thus degraded by the craft of man, by no care or skill of husbandry can man restore the plant to its pristine state. The one condition of their permanency in the world, of their diffusion, of their growth in quantities adequate to man's needs, is that they be sown of man in ground carefully prepared by him for them beforehand, and duly fitted to receive them."

With respect, however, to the native properties of things inanimate, our belief is as strong as possible. Why, indeed, should our knowledge of them be inferior to that of those who deem them paramount, and even sacred, and shape them into gods, and worship them? What gives science and the arts their acknowledged great power, but the ascertained properties of matter, and the known uniformity of its operations? So far, however, as the supremacy of mind is ignored, all philosophy must be lame and incomplete. It may have a middle, but no beginning and no end. While it sets at naught the information of scripture as to the government of God, and the services of his living agents, it must be counted repugnant to both reason and truth.

The power of living natures over matter is well seen in our day. By the laws of the inanimate creation, as known since the beginning of the world, a vessel carrying a thousand or two thousand tons was forbidden, so to speak, to pass over the Atlantic in ten days—it was counted very fair if she crossed that ocean in less than forty days; the laws of nature never so harmonised and co-operated as to convey so great a weight and bulk through that wide and stormy sea in so short a time. But now, natural forces, adapted and organised by the paramount efficiency of the human mind, do what, left to their own energy, they never could accomplish. Who, fifty years ago, could have imagined it at all possible that a man sitting in his chamber, by handing to another a slip of paper containing certain inquiries should, within an hour, have the wished for information from a distance of many hundred miles? or that the time from the despatch to the arrival of information, in a distance of fifteen hundred miles, should be less than one second? But this the electric telegraph, as a swift messenger, is continually doing.

Could steam or electricity do these things without mind? What was formerly scouted, even by the learned, as absurd and impossible, is now done with ease, and that continually. When Sir Isaac Newton said that, in consequence of the increase of knowledge (and what but the living mind could grow in knowledge), there would yet be a mode of travelling at the rate of fifty miles an hour, the witty philosopher, Voltaire, judging by the laws of nature as

known by him, called the great explorer of "nature, and nature's laws" a poor dotard, who in his old age began to study that book called the Bible. It was by ignoring the power of mind over matter, that Voltaire pronounced Newton a dotard; and Hume declared a miracle impossible, or at least impossible to be proved.* What physical forces cannot effect, the mind of man, and much more, superhuman minds, can do with ease and certainty. Nay, more, this is done by the feeblest insects. In the sea, they form rocks and even islands. On land, caterpillars produce silk; wasps manufacture paper; bees not

* The following anecdote is from the *New World*:—"I then asked him to explain to the Comanche the magnetic telegraph. He looked at me earnestly, and said, 'What you call that magnetic telegraph?'—I said, 'You have heard of New York and New Orleans?'—'Oh yes, he replied.—'Very well; we have a wire connecting these two cities, which are about a thousand miles apart, and it would take a man thirty days to ride it upon a good horse. Now a man stands at one end of this wire in New York, and by touching it a few times he inquires of his friend in New Orleans what he had for breakfast. His friend in New Orleans touches the other end of the wire, and in ten minutes the answer comes back—Ham and eggs. Tell him that, Beaver.' His countenance assumed a most comical expression, but he made no remark until I again requested him to repeat what I had said to the Comanche, when he observed, 'No, captain, I not tell him that, for I don't believe that myself.' Upon my assuring him that such was the fact, and that I had seen it myself, he said, 'In'jun not very smart; sometimes he's big fool, but he holler pretty loud; you hear him maybe half a mile; you say 'Merican man he talk thousand miles. I 'spect you try to fool me now, captain, *maybe so you lie.*'"—*The Prairie Traveller*. Now, place the wisdom of the sparkling Frenchman, and his faith in the contemplated achievements of science, beside the judgment and belief of the freeborn child of nature, and how exactly do they tally. The former derides the hopes of a contemplated triumph; the latter, blindly incredulous, denies an accomplished fact. Yet, what do we see in both achievements—the locomotive and the telegraph—but the application, by man, of power produced by God for his good, when he created the world and set all its parts in order.

only make honey, but construct honey-combs with mathematical exactness, of the greatest strength, and with the smallest possible expense of materials, which they fill with valuable treasure skilfully extracted from the flowers of the field.

The Atlantic cable has been justly called "an outward sign of the potency of scientific agency, which fitly typifies the possession by mankind of a common empire over nature, and the wild forces of the world."

The mind of man discovers and brings to light the latent properties of matter, which, after remaining secret since the world began, are thus called forth for most important services. Men of science and research discover how vital elements and explosive substances can be made to act upon ponderous unwieldy masses. The most acute and thinking minds acquire the greatest power, and facility of moulding and actuating inert stubborn matter, and changing its conditions and effects. Without this law of nature—the power of mind over matter—many substances would remain dormant and motionless, which are now found of the highest value in enterprises of the greatest difficulty and importance. It was not in vain that God said to Adam, "Replenish the earth, and *subdue it*." Mental power is incomparably higher than all physical forces. Conceive, then, if you can, the power of Almighty God over all his works. He who knows the nature of all things, and the qualities which he imparted to the universe, is continually doing infinitely more than we can com-

prehend. He can certainly accomplish all that his own word ascribes to him, or we require to believe. The Bible disclosures of the majesty of God reveal but "parts of his ways," and with reason adds, "The thunder of his power, who can understand?"

In the use of natural substances men of science can increase their power wonderfully. Heat can be raised to an intensity which might seem preternatural. Light also can be augmented to a brilliancy unknown in a state of nature, except as displayed by the sun. Art can produce explosive substances of greater force than gunpowder. Such results as these far exceed the ordinary sequences of nature, and demonstrably display the paramount authority of mind. It was not possible that dead matter should equal the living nature of even the lower tribes of being; or that these should rise, like man, to the dominion of the world; or that man, who is over all, should equal the "mighty angels," who in a moment, suddenly, without preparation or parade, have done works before the eyes of man which very far surpass all the wonderful results of the most perfect science. Those ministers of God, who do his will, are accordingly compared to wind and lightning. They need not any apparatus to illuminate the gloom of the wilderness, or the darkness of a prison, or to kindle a devouring fire, or render such a fire, when most intense, innocuous. In these acts of power, why should we not believe them as observant of the laws of nature, and necessarily so, as we know they are of the laws of righteousness? And does not God conduct the

universe with the most perfect adaptation of its qualities to the life of all his creatures? Can anything be of a nature to impede the hand of God, or to stand in the way of his living messengers? "Order is heaven's first law," and the regularity of nature abundantly evinces God's dominion over it. Now, to the regularity and laws which we unjustly vaunt against God; we owe our own power in the world. And the better we understand them the more successfully do we "subdue the earth." To their knowledge of the works of God, no less than to their native strength, the mighty angels owe their dominion as the ministers of providence. And if neither their power nor ours, or that of any living tribe, sets aside the laws of God, but evermore fulfils them in the heavens, in the earth, and in the sea, will not God's dominion and his working accord throughout with the order and constitution which he has established? It cannot possibly be otherwise; "God cannot deny himself."

There are vital elements, as heat, light, and electricity, which have with reason been called the soul of the world: they are greater than the substances on which they act. But man, who was created a "living soul," is greater than they. While they pervade all other substances and act upon them, they are themselves instruments in the hand of man. Fire, though capable of consuming all things, does not apply itself, but is applied by living agents; and behold what a mighty conflagration a little spark kindleth! Strike a light, and it will burn; send the

lightning, and it will go. The fact that we can apply light and heat, and that lightning brings rain, better teaches the principles of the divine government in the natural creation than a thousand theories.

May we not here remark an obvious analogy between the natural and moral world. The ruling, vital, and elastic forces, whose power is from on high, are, in the hands of man, the most obedient and tractable. In like manner, the lowliest and most gentle minds in the kingdom of the Son of God are accounted the greatest. Nor are the mightiest of the angels of light more remarkable for their strength and speed than for their obedience, benignity, and goodness. While "mighty of strength, and doing his word," they are also "hearkening to the voice of his word."—Psalm ciii. And that formidable material agency, which fills the world with terrible commotion, flashing and thundering from one end of heaven to the other, and smiting down the strongest towers of earth, remains latent and quiescent until awakened and sent forth by the power that created it, and "directeth his lightnings to the ends of the earth." It was created to obey, not to rule; to be the servant of the God of heaven, and an instrument of providence—not a slave of blind insensate law. And as you would not trust or guide a ship without a helm, or a fiery horse without a bridle, much less could you conduct the lightning without a way and power to direct it.

It happens, then, very satisfactorily, that where our scientific men show the laws of nature to be fixed

and uniform, the scriptures teach the same doctrine with the greatest clearness; and when, again, our scientific men wander, and are most at fault, as in respect of those fitful and contingent processes in which living natures may be supposed to act, the light of scripture shines forth like the sun to dissipate their darkness.

MIRACLES IN RELATION TO THE LAWS
OF NATURE.

WE believe miracles to be not only accordant with the laws of nature, but strikingly illustrative of God's method of governing the world. "Signs and wonders, and mighty deeds," though superhuman, and with respect to us preternatural, being a distinct department of the divine administration, as when God created the world, can in no instance be considered violations of the laws which the God of nature has ordained. The scripture doctrine accordingly places both miracles and providential occurrences in the same category, as being equally effected by the same divine power, and designed to accomplish the one great purpose of God, as revealed in the gospel. The former, from their unusual and extraordinary character, are pre-eminently fitted to arouse attention, and to convince mankind, through the testimony of their senses, of the presence and operation of God. God's extraordinary dealings with the prophet Jonah, as made known to the Ninevites, account in part for his remarkable success. He was a sign, no less than a preacher of righteousness, to the men of Nineveh. The facts of Christ's death, burial, and resurrection, as attested by inspired witnesses,

would, in like manner, through the power of the Holy Spirit, work mightily upon the minds of men.

Miracles, though of a superhuman character, were in many instances effected by the ministry of angels, yet always in such a manner as to evince the presence and authority of God. As to false miracles, they have ever been a dangerous experiment, which, in the end, never failed to expose the imposture they were intended to support.

Of the signs and wonders exhibited by Moses in Egypt, the magicians were compelled to say, "This is the finger of God." Those mighty deeds were the work of angels. The Holy Spirit, by the mouth of David, says, "He cast upon them the fierceness of his anger, wrath, and indignation, and trouble, by sending evil angels among them,"—messengers of evil to the Egyptians.—Psalm lxxviii. 49. With similar inflictions the offending Hebrews were afterwards visited, first in the wilderness and afterwards in Canaan. Of the army of the Assyrians the angel of the Lord smote 185,000 in one night. To Herod a holy angel was in like manner a messenger of evil. When the people shouted, "It is the voice of a god, and not of a man; immediately the angel of the Lord smote him, because he gave not God the glory: and he was eaten of worms, and gave up the ghost."—Acts xii. 22, 23.

To those who would understand the miracles of scripture, and take lessons on the laws of nature from the book of God, the doings of the holy angels are abundantly instructive. The fire which arose from

the rock and burnt the sacrifice of Gideon, the flame in which the angel ascended in the sight of Manoah, the fire which Elijah called down from heaven, together with the remarkable deliverance from prison of the apostles in Jerusalem, and then of Peter from the hands of Herod, although extraordinary, and in our eyes preternatural, did not disturb the settled order of the world any more than is done by the lightning and rain. The mere application of living force, or the augmentation or diminution of physical energy, and its effects on the course of nature, is not, in any sense whatever, a violation of the laws of nature. Yet, when this was done by superhuman power, the thing was always so effected as to attest the presence and authority of God, or the agents sent by him. Indeed, in the eyes of mankind, no miracles were more remarkable than some of those performed by angels. And, in the ordinary providence of God, their services, if we had eyes to see them, would wonderfully enlighten our material philosophy. They preserve "from the pestilence that walketh in darkness, and from the destruction that wasteth at noonday." "They are all ministering spirits, sent forth to minister for them who shall be heirs of salvation."—Hebrews i.

"The power of working miracles," it has been justly observed, "may descend from the Almighty, through a gradation of good spirits. Both good and evil spirits are under his control—they fulfil his pleasure, and he works by them."—*Dr Hill's Lectures on Divinity*, pp. 48, 9. The power which

they exert belongs to them naturally, as much as our more limited ability naturally belongs to us. When an angel preserved the three Hebrew young men in the fiery furnace, and again withheld the lions from devouring Daniel, they did nothing more than use their native power as the ministers of God ; and in nothing is this power more admirably shown than in the vital elements of fire, light, and electricity, of which the properties and laws are so little understood by men of science.

"The order of nature," remarks a distinguished foreigner, "being subordinate to creation, power may be changed in the measure, time, and way that may seem best to the overruling wisdom. A miracle, which is contrary (beyond) to the laws of material nature, is in conformity with the moral and superior law of the universe. That supreme law is the subordination of matter to mind—of the sensible to the intellectual order of the world. God, therefore, far from disturbing universal harmony, maintains it by interrupting the course of physical forces in certain determinate cases, and for a most wise end. A miracle is not incredible on the supposition of a God."—*Gioberti. N. B. Review*, No. 22, p. 404.

Both miracles and the ordinary operations of providence being placed in scripture in the same category, we may hence expect to find that events which are with reason deemed miraculous, will, in some instances, exhibit the appearance of a mixed character, partly natural and partly preternatural. The east wind which dried up the Red Sea, and

again brought quails round about the camp of Israel, together with the thunder and the tempest through which the Philistines were discomfited in the days of Samuel, were evidently sent by God. The latter phenomenon, which was unusual and unexpected in the time of wheat harvest, was again a second time exhibited. "Now therefore stand and see this great thing, which the Lord will do before your eyes. Is it not wheat harvest to-day? I will call unto the Lord, and he shall send thunder and rain; that ye may perceive and see that your wickedness is great, which ye have done in the sight of the Lord, in asking you a king. So Samuel called unto the Lord; and the Lord sent thunder and rain that day: and all the people greatly feared the Lord and Samuel." With so much of nature as was then in operation, some may be inclined to attribute those remarkable phenomena entirely to *law*, and so include them in the ordinary sequences of nature, and regard them as in no respect miraculous. The people who knew the climate and its conditions, viewed those events as the doing of the Lord, in answer to the prayers of his servants. The Holy Spirit, in reference to them, saith, "Moses and Aaron among his priests, and Samuel among them that call upon his name; they called upon the Lord, and he answered them. He spake unto them in the cloudy pillar."—Psalm xcix.

The prominent physical agency in those commotions of the elements was electricity, which required only to be called from its latent and inactive state, to produce sudden and extraordinary changes. By

no inspiration of its own did this potent fluid go forth so opportunely to chasten the Philistines and reprove the unbelief of Israel. Nay, by what inherent energy or external influence does it go at all, except it be sent? The reply to these questions would, by our philosophy, be found in the indefinite term *law*. An inspired writer would explain the matter differently. "His lightnings enlightened the world: the earth saw and trembled. The heavens declare his righteousness, and all the people see his glory."—Psalm xcvi.

In divers other interposals, wherein the hand of God is manifest, both the ordinary and the extraordinary seem to have been blended. Isaiah said: "Let them take a lump of figs, and lay it for a plaster upon the boil, and he shall recover." Was this cure natural or miraculous? Is there is not something that looks each way? Read the whole narrative. Look also at the victories of Gideon and Samson. Divine interposal and ordinary forces harmoniously co-operate. The stone which brought down the champion of the Philistines was slung by the hands of David under the directing energy through which he had before slain the lion and the bear. These results are thus attributable to both mental and physical—ordinary and extraordinary causes. No law of nature is set aside, while the power of the Lord is remarkably displayed.

Miraculous energy, while it stimulates and aids nature, and supplies it with what is lacking, is not superfluous or antagonistic, but auxiliary; for both

it and nature are equally of God. Nature, being itself the creation of God, is ever subject to the power which produced it. Hence both are always ready to co-operate. In works of power and mercy the energies of nature are not suspended but applied. And in this we recognise the primary, paramount, universal and eternal law of the superiority of mind to matter—of things without life to living agency, and the consequent subserviency of all things to the wisdom and dominion of the great Being by whom they were created.

In a way analogous to the miracles of the Mosaic dispensation were the signs and mighty deeds of our Lord and his accredited ambassadors performed. Men were healed suddenly of maladies which in many instances are known to be cured by ordinary remedies. Miracles of this kind may be said to consist in the suddenness of the cure. Thus Jesus healed Peter's wife's mother of a fever. When the world was made, God said, "Let there be light, and there was light;" and when Jesus came to save, he said to the leper, "Be thou clean;" and to the blind, "Receive thy sight." The physical, being of necessity subservient to the moral, miracles are, in truth, the most remarkable fulfilment of the essential subordination of the material to the spiritual—of the thing made to him who made it. And this holds true in all the phenomena of nature. Physical energy is not brought, nor indeed can it be, into a forced or unnatural subserviency to mind when a miracle is wrought, but rather, in the clearest manner, made

thus to show the essential supremacy of living power ; and in like manner, the most splendid and striking chemical experiments and mechanical operations evince the power of the living mind over things without life. While a concentration of natural forces may be needful, no law is suspended when God is pleased, either suddenly, or by degrees, to exercise his high prerogative as Lord of all. No law of nature is broken when, by improvement in the arts, a result is now secured in one day which formerly required the operation of successive months. In what way soever God is pleased to work and quicken into life, "the less is blessed of the greater." This principle is primary, essential, supreme, and must be everlasting. Here, however, philosophers, disagree among themselves. Mr Babbage, who inclines to assign miracles to the laws of nature, thinks it more consistent with the attributes of Deity to look upon them "not as deviations from the laws assigned by the Almighty for the government of nature and of mind, but as the exact fulfilment of much more extensive laws than we suppose to exist."—p. 92. And he further adds—"If we were endued with accurate and higher reasoning faculties, they are the very points we should seek to observe as tests of any hypothesis." To this we readily subscribe, though not in a sense to exclude the immediate fiat of Deity. The power that works miracles can surely regulate the course of nature, as the power which created all things is still sufficient to sustain and govern them. Accordingly, as formerly remarked, the word of God places miracles and the

ordinary works of providence in the same category. On the other hand, however, Dr M'Cosh, altogether excluding physical causes, ascribes miraculous works solely to the divine volition. "We see no advantage in calling in special interpositions acting without physical causes—always excepting the miracles employed to attest divine revelation."—p. 194. Here, then, are two philosophic theories the most different imaginable—nay, the most contrary the one to the other. The one theory, by assigning miracles to physical fixed laws, removes the hand of God back to the first epoch of creation, when those laws were enacted; the cause of miracles existed, according to Mr Babbage, in the constitution of the world. The other theory, altogether excluding "physical causes," attributes miracles solely to the fiat of God. Yet the authors of those diverse theories have deeply studied the phenomena and laws of the physical creation, and both have felt it their duty to administer rebuke to such as, through superstition or too religious a bias, keep closely to the words of scripture, and prefer God's own account of his own doings to the speculations of philosophy. "Many piously disposed minds," says Dr M'Cosh, "are inclined to be jealous of the discovery of law; they feel as if science were setting itself as a rival to Deity."—p. 126. Again he charges them with "superstition" and "delusion" in rejecting the supremacy of law. But offenders in this way, are, we apprehend, not numerous; or if there be many such, we, for our part, have not known them. Sincere believers in divine revelation love to use the

language of inspired men in speaking of the works of God. And not a few who esteem the Bible "as being indeed the word of God," are well known as successful cultivators of natural science. The Bible has not taught them to admire Galileo's persecutors as men of tried, ardent piety. The prevailing fault of even sincerely religious people is, that they look too much to second causes, and trust far too little to the care and faithfulness of God, by whom "the very hairs of their head are numbered."

Now, we may suppose some outspoken religionist,—one not particularly superstitious, thus to address the learned authors of the forementioned theories :—
"Gentlemen,—I believe your rebukes to be well intended, and thank you for them. Yet, I certainly deem them hasty and unmerited. Between yourselves you differ as widely as the poles. One ascribes miracles to the living God, and admits not the action of physical causes. The other assigns them wholly to those causes, and entirely excludes the interposal of God. The two mothers who both claimed the living child, and refused the dead one, were not more at variance than are your two most contradictory hypotheses. And until you see your way more clearly, and give better reasons for your judgments of the works and ways of God, I will certainly prefer the intimations of the Bible and the common sense of mankind to 'oppositions of science, falsely so called.'"

Although, upon the whole, we much prefer the hypothesis of Dr M'Cosh to that of Mr Babbage, we nevertheless hold with the latter that miracles were

not wrought irrespectively of physical causes. In such displays of divine power as the gift of tongues, the casting out of demons, and the raising of the dead, there seems no place for material agency. But there were signs and mighty deeds of another kind. In the deluge, in the destruction of the cities of the plain, in the drying up of the Red Sea, and the descent of manna in the desert, the operation of natural agencies is unquestionable. In the restoration of the withered hand to its natural condition, new tissues were supplied, and thus in the course of providence, as in miraculous causes, we see the feeble and emaciated strengthened and restored to health and comeliness. New tissues are effected, and the sufferer is "renewed like the eagle." In the restoration of the sick, the blind, the paralytic, and the leprous, whether by miracle or in the ordinary way, it consists with the divine procedure to believe that new substances are not created, but existing ones are modified, as in Adam's body, which God made of the dust of the ground. The production of a new substance would have been another miracle, and God does not employ unnecessary agencies nor perform unnecessary acts : all the constituent parts of flesh and blood and bones exist already in abundance, which, in miracles, need not to be produced, but only used, as in the ordinary process of recovery.

It is then with reason the miracles of scripture, however great, and the ordinary dispensations of providence, however common, are put by the inspired writers in the same category. Isaiah refers to

the drying up of the Red Sea and of the Jordan, as a reason why the people should still expect God's interposal in a suitableness to their ordinary wants ; chap. xliii. 16, 17, and chap. l. 2. And who can consistently acknowledge the operation of God in those wonders of old, and deny the exertion of his power in the dispensations of his providence ? Such mighty works of God are recorded that we might "believe him for ever." And accordingly, both Isaiah and Habakkuk predict a great deliverance of Israel in the latter days, which shall appear to be as certainly of God as the great miracle of Joshua.—Isaiah xxx. 26 ; Hab. iii. 11.

And it is hence very evident that the word of God recognises the most surprising miracles, and the occurrences of the ordinary dispensations of divine providence are equally included in the active and continuous administration of the world.

This doctrine is forcibly inculcated by our Lord's reproof to the disciples, for having overlooked the mighty power by which thousands of the people had been recently supplied with food. "O ye of little faith, why reason ye among yourselves, because ye have brought no bread ? Do ye not understand, neither remember the five loaves of the five thousand, how many baskets ye took up ? Neither the seven loaves of the four thousand, how many baskets ye took up ? How is it that ye do not understand that I spake it not to you concerning bread, that ye should beware of the leaven of the Pharisees and of the Sadducees ? Then understood they how that he bade them not

beware of the leaven of bread, but of the doctrine of the Pharisees and of the Sadducees.”—Matt. xvi. 9-12. And there is now no less reason to beware of “vain imaginations,” which would deny to God the wisdom and prerogative of truly and explicitly describing in his word his own works of creation and providence. So far are miracles from being deviations from God’s established laws, or, as Hume would say, “transgressions of the laws of nature,” that (to repeat the words of Mr Babbage) “they are the very points we should seek to observe as the truth of any hypothesis.” Neither a miracle nor the answer of prayer “is incredible, on the supposition of a God.” God’s extraordinary interposals show him to be present of a truth in governing mankind, and “not a God afar off.” His miracles, accordingly, still afford a strong ground of confidence in prayer. Has God, in answer to prayer, done that which is greatest, and will he not do that which is least? “Elias was a man subject to the like passions as we are, and he prayed earnestly that it might not rain: and it rained not on the earth by the space of three years and six months. And he prayed again, and the heaven gave rain, and the earth brought forth her fruit.” Hence the exhortation, “Is any afflicted, let him pray.”—James v. 17, 18.

Now, it being evident that men of science have entirely failed to discover any power in nature, or, as they love to express it, any *law*, by which the action of its vital forces are originated; and that, moreover, while acknowledging the truth of miracles, they have

widely differed as to their nature and cause, is there any reason why we should not refer to the authority of revelation, by which both miracles and the ordinary occurrences of providence are placed in the same category, as equally the doing of the Lord?

The evidence which miracles afford to the truth of revelation is an interesting study, and "easy to be understood," if prejudice and passion are placed in abeyance. A great source of error in regard to miracles lies in the separation of the natural from the divine—the human from the preternatural. While the divine and preternatural escape our optics, the natural and human stand clearly out before us. When the dead were raised again to life by the Son of God, men saw only the natural and human: the divine and preternatural remained to be considered. How the life was restored you might not easily conceive, but that he who had been dead was now alive admitted not of doubt. Hume, who asserted miracles to be impossible, or impossible to be proved, was much affected by his mother's death. If one sent from God had restored her to life, like the ruler's daughter, would Hume doubt the fact that his mother was alive again? and if, like Lazarus, she had lain in the grave till putrefaction had commenced, and then been raised to life, would he not admit the wondrous phenomenon? Would he not even offer proof? You saw her dead and buried; you see her now alive. If you must have other evidence, ask those who saw her dead body, and again beheld her risen from the grave.

The man whose sight was restored by miracle wisely waived the question of the divine and preternatural. "Whether he be a sinner or not," he said to Christ's adversaries, "I know not; one thing I know, that whereas I was blind, now I see." That did not satisfy them; they wanted to penetrate into the divine and incomprehensible. "How opened he thine eyes?" That he could not tell, and they could not understand; yet he answered discretely. "Since the beginning of the world it was not heard that any man opened the eyes of one who was born blind. If this man were not of God, he could do nothing. They answered and said, Thou wast altogether born in sins, and dost thou teach us? And they cast him out."—John ix. This aspect of the wisdom of this world is still beheld in the usual acknowledgment of the things of nature, while what relates to God is indignantly denied. "M. Renan accepts the testimony of the evangelists in the account they give of the Passion. Why should this testimony suddenly lose its value, and become a heap of fables, the moment it bears upon the resurrection? Supernatural is synonymous with fable and invention."—*The Critical School and Jesus Christ*, by Edmond de Pressensé.

Such was afterwards the obduracy of the priests and rulers; of the fact of the miracle of the healing of the lame man by Peter and John (Acts iv.), they were compelled to say, "What shall we do to these men? for that indeed a notable miracle hath been done by them is manifest to all them that dwell in Jerusalem; and we cannot deny it." What was

natural and human was undeniable—the divine and preternatural, or the efficient power, they were not in a temper to admit.

Now, to admit, as Hume does, that God created the world, and, at the same time, to deny that omnipotence can raise the dead to life, or open the eyes of the blind, and that such facts are incapable of being proved, is surely the most unblushing falsehood and absurdity that can possibly be uttered in the name of philosophy !

ACKNOWLEDGED IGNORANCE OF THE
WORKS OF GOD.

It is surely most desirable to be able to judge correctly of the extent of our acquirements. And who would not wish his own mental treasure, and not less the mental riches of the world, to be exceedingly augmented. Great advances have been made in science and the arts, and with manifold advantage to mankind. When, however, we look around us on all the works of God, and hear our men of greatest science acknowledging their ignorance, are we not admonished to be sober-minded, and ready to admit that "if any man thinks he knoweth anything, he knoweth nothing yet as he ought to know."

To those who love to set forth new theories and frame new hypotheses of the government of God, we cannot justly impute the infirmity of forming too low an estimate of their own acquirements. Yet how immeasurably far are they from the knowledge or the comprehension of "the whole scheme of divine action in the government and arrangement of the universe." One pre-eminently skilled in the mysteries of science, and withal a thorough and sincere believer in divine revelation, thus expresses his opinion : "If within the very domain of that science

which is most within the grasp of human reason—which rests on the firm pillars of demonstration, and is totally removed from doubt or dispute, there be truths which we cannot comprehend, why should we suppose that we can understand everything connected with the nature and attributes of an infinite being? ‘For if ye understand not earthly things, how shall ye those that are heavenly?’” — *Sir William Rowan Hamilton, North British Review, Sept., 1866.*

And if those possessed of highest scientific knowledge willingly admit much remaining ignorance of the vital ruling energies and forces of creation, are we not entitled to ask others, For which of their diverse theories can we safely abandon the well-tried principles of the oracles of God? “It must be allowed,” says Mr Hume, “that nature has kept us at a great distance from all her secrets, and has afforded us only a few superficial qualities of objects, while she conceals those powers and principles on which the influence of these objects entirely depends.” Well and truly said! But if those powers and principles are in the hands of God, and you seek them in the sequences of nature, you still dwell in a land of darkness, knowing only a few superficial qualities and unexplained phenomena.

To Hume’s just observation on our inevitable ignorance of the secrets of nature, may be added his estimate of the general fitness of professed philosophers to enlighten mankind. “I have long,” he says, “entertained a suspicion with regard to the

decisions of philosophers upon all subjects, and found in myself a greater inclination to dispute than to assent to their conclusions. There is one mistake to which they seem liable, almost without exception; they confine too much their principles, and make no account of that vast variety which nature has so much affected in all her operations. When a philosopher has once laid hold of a favourite principle, which perhaps accounts for many natural effects, he extends the same principle over the whole creation, and reduces to it every phenomenon, though by the most violent and absurd reasoning. Our own mind being narrow and contracted, we cannot extend our conception to the variety and extent of nature, but imagine that she is as much bound in her operations as we are in our speculation."

Thus does Mr H. both confess the meagreness of science, and the frequently one-sided and contracted views of its votaries. Much, no doubt, has been discovered since his time. Yet still men's knowledge of the works of God is extremely limited, as is candidly acknowledged by all our most eminent philosophers. Alas, "the dislike of men to revelation unfits them for taking a true view of his works. The *nebulae*, geology, meteorology, archæology, chronology, have all for a time been turned against the Bible."

Philosophic journalists, who have frowned on prayer to God for the removal of a dire pestilence, esteeming such prayer as the fruit of a depraved superstition, have, at the same time, acknowledged

the hitherto inevitable ignorance confessed by Hume. "There are mysteries in the creation," say they, "which beget wonder, self-annihilation, and reverence. When science pushes its discoveries to the utmost, it is just as far off a solution of the mysteries of our existence as before it began its observations."

Now, such being the admitted superficiality of scientific men, and the comparatively scanty fruit in the direction of the government of God, of all their investigations, most sincerely do we sympathize with them in their sense of still remaining ignorance, and very cordially would we cheer them on in their slow endeavours after further light. We are not afraid they will find out too many laws, or penetrate too deeply into the beautiful adjustments of creative wisdom, or overwhelm us with the number and magnitude of their discoveries, or at all shake our confidence in revelation by the vastness and splendour of their achievements. And while, in the meantime, we confess ourselves annoyed by their over-weening confidence, it is more in grief than in displeasure we beg leave to ask, Why substitute hypothesis for evidence? Why affirm dogmatically what you do not understand and cannot prove? The man who cries *Eureka* (I have it now), however rashly, may be excused when he assumes the office of instructor, for he believes he has knowledge to impart. But for a man who has lost his way, without any certain hope of ever finding it, to offer himself as a safe and practised guide, and to look with scorn

on those who will not trust him, is certainly no proof of either the perfection of human reason, or of a very exact standard of moral rectitude.

The Bible has hardly restrained civilized Europe from the foulest superstition and idolatry, or from decreeing the immolation of the guiltless as a meritorious and great act of faith; neither has the "Novum Organum" of Bacon taught our wise men to prefer the evidence of facts to their own imaginings. When science shall have been purged of its arrogance and scepticism, and scientific men (its cultivators) cease to veil their speculations in unmeaning but imposing phraseology, the ascertained phenomena and properties of matter will be regarded as the germ of physical discovery; and this all will receive thankfully, and value highly, as the fruit of enlightened and mature investigation.

The necessarily stinted measure of scientific knowledge is abundantly testified by many competent to judge. "Science, with its methods of inference," says Mr Isaac Taylor, "carries us a little way beneath the forms and semblance of things, and only a little." "Scientific investigation," Dr M'Cosh remarks, "has gone to its furthest point when it has discovered the substances and the condition needful to their operation. In astronomy, we arrive at last at gravitation and the relation of the celestial bodies, which enables that property to act, and we feel that inquiry must now cease. In chemistry, we ascertain that a certain compound is composed of two or more elementary substances, which unite according to a certain rule,

and the mind must rest here." And is this all that science teaches of the works of God? Does this rudimental knowledge lay open the secrets of omniscience? Does it supply us with answers to such questions as God was pleased to ask his servant Job? Chap. xxxviii. Between astronomy, whose province is very far off, and chemistry, whose operations are performed around us, is the wide and little-understood domain wherein the hand of God guides unseen the elements which rule the world, and on whose influence and evolutions we ourselves and all living things depend. It is here especially that "nature has kept us at a great distance from her secrets," and restricted us to the contemplation of the superficial qualities which astronomy and chemistry disclose.

Between the heavens and the earth the vital forces of heat, and electricity, and magnetism, reign with mighty power. The chemist in his laboratory, and the astronomer in his observatory, do not know of what these potent ruling elements consist; yet in them resides the extraordinary force, which, in the hand of God, sustains and rules the world. Can science tell us how these vital elements are generated, or by what laws they are directed, or who says to them, "Hitherto ye shall go, and no further; or, here shall your mighty influence and terrible commotions cease?"

Now, to the subject of weather, and to its changes and causes of change, concerning which there is so much uncertainty, belongs the operation of sidereal

and atmospheric influences. Heat and moisture, storms, hurricanes, and droughts, famine and abundance, salubrity and pestilence, suffering and comfort, are involved in what we call weather, and what in scripture is included in "the firmament of his strength." And what is there in the whole machinery of nature, the management of which we more readily ascribe to God than the elements, by which we know he regulates the seasons, and the conditions of the atmosphere? He alone it is who makes the sun to shine and the rain to fall. It is evident, then, that our philosophers are not better qualified than others are to show how the world is governed. Let their services and merit, by all means, be duly appreciated; yet let us not be deceived, nor forget the fact that they know not, any more than others do, "what shall be on the morrow." If science had fitted them for revealing the secrets of divine providence, would they not have ceased to frame conflicting theories, and to send them forth with a reluctant and humbling confession of inevitable ignorance of the vital energies and sequences of nature. Legitimate science—the true knowledge of the works of God—is of inestimable value. "Wisdom," said a scientific monarch, "excelleth folly, as far as light excelleth darkness." We look accordingly to men of science who reverence the word of God, for such extended and consistent views of creation and providence as shall accord with the revelation of his truth and mercy, satisfy mankind, and put to flight the moles and bats of every unfledged hypothesis. In

the meantime we are warranted to ask, Where is the right of any man to dogmatize in respect of matters, which, by his own confession, he does not understand? Is it the part of wisdom first to acknowledge ignorance, and then to assume a right to dictate and to teach what is confessedly unknown? Such conduct, in common life, would be ascribed less to want of information than to want of honesty and common-sense. One is really amazed at the confidence expressed in what is freely admitted to be incomprehensible. Priestcraft itself has not been more inventive and assuming in regard to the authority of scripture and the honour due to God and conscience, than our sceptical and material philosophy in reference to the power of God as the maker and preserver of the world. Yet in this proud crusade against divine revelation not a few exhibit not only a certain fanatical earnestness, but a helpless subserviency to some approved leader, who, in truth, knows as little as themselves. "A dominant idea," it has been remarked, "emanating from a man of genius, and investigated by his successors, reigns for a long period exclusively." But why be tenacious of principles and laws which are confessedly hypothetical and incapable of proof; and wherefore put unknown laws in the place of God's government, and ascribe the operation of this power to the qualities of matter? Neither in history, nor in any other science, as in that which relates to the government of God, do men of any reputation contend for what they have not seen, or at all known to exist.

Des Cartes, who has "the reputation of standing at the head of the whole modern movements of the metaphysical philosophy, was led to assume the human consciousness as the standing point of all scientific research."—*Morell*. And this position seems to commend itself to some extent to our understanding, for we are made after the image of God. But, much as it behoves us to know ourselves, we have not yet discovered all the laws by which our life is sustained, and all its functions regulated. The very standing point of all our scientific research, (namely, human consciousness,) presents us with insuperable difficulties. It is not deemed certain whether the brain is the seat of life, or whether, as the Bible speaks, "the blood is the life of man," which, after some sort, pervades and animates the whole body. Nor can we distinguish all the influences by which the mind is affected, and assign to each its proper place and power. Are the effects of truth and error, love and hatred, hope and fear, grief and joy accurately ascertained? Do men understand how the mind, through the body, is moulded by physical laws, and in what degree it is, at the same time, swayed by intellectual and moral considerations?—the former, by reason of sin, pressing it like gravitation down to the earth; the latter, like an ardent flame, or the wings of an eagle, raising it up towards heaven. And as we cannot perceive by how many agencies our minds are influenced, so neither can we tell by how many influences our bodies are affected. "Man's goings are of the Lord,

how can a man, then, understand his own way?" Being of a complex nature, he is acted on by diverse influences. Climate, occupation, contact, sustenance, habit, and divers principles affect him. How great the power of the mind on the body! for it is the seat of knowledge, love, fear, grief, hope, strength, joy; and, as the inmate and ruler of the body, it directs and governs with inconceivable facility. "A merry heart doeth good like a medicine: but envy is the rottenness of the bones." The turn of a fever has followed a word fitly spoken. The pleasing and steady hope of recovery, together with invigorating exercise, has restored the pining down-cast invalid to health. Sudden danger has put pain to flight, and roused the muffled invalid to heroic effort. Great unexpected worldly joy has not only upset the mind, but presently destroyed life itself; while despondency and anguish, and consuming care, have slain, and yearly slay, their tens of thousands. What man of science and observation—what physician of experience and skill, can always see his way clear amidst so vast a crowd of opposing and partially discovered influences? Who, then, can tell by what agencies and forces the world is sustained, and its operations conducted? Plato thought the world an animal; and it as much, at least, resembles an animal as a machine in the operations of providence. Do men know how the vital elements, by which the world is sustained and governed, are actuated and applied? "As thou knowest not what is the way of the spirit, nor how the bones do grow

in the womb of her that is with child : even so thou knowest not the works of God, who maketh all things."

In the justice and accuracy of the following remarks, on the still limited acquirements of philosophy, not a few will concur. "The object of physical science is to discover such laws and properties as those of which we have spoken. In this task undoubtedly a progress has been made, on which we may well look with pleasure and admiration ; yet we cannot hesitate to confess that the extent of our knowledge bears no proportion to that of our ignorance. Of the great and comprehensive laws which rule over the *widest* provinces of natural phenomena, few have yet been disclosed to us. And the names of the philosophers, whose high office it has been to detect such laws, are even yet far from numerous. In looking back at the path by which science has advanced to its present position, we see the names of the great discoverers shine out like luminaries few and scattered along the line. The person whose mind is employed in reducing to law, and order, and intelligible cause, the complex facts of the material world, is compelled to look beyond the present state of his knowledge, and to turn his thoughts to the existence of principles higher than those which he yet possesses." "He cannot consider any principles which he has already attained as the ultimate and sufficient reason of what he sees. There must be some higher principle, some ulterior reason. The effort and struggle by which he endeavours to extend

his view, makes him feel that there is a region of truth not included in his present physical knowledge; the very imperfection of the light in which he works his way, suggests to him that there must be a source of clearer illumination at a distance from him."—*Whewell.*

Now, what higher principles than such as we already possess, or what intelligible cause of the facts of the material creation shall we hope to find, except the revealed yet inscrutable operation of God? For since the matter of the universe is not hid from us, and since the laws of nature belong to the properties of matter, which are open to investigation, is it not highly probable that our ignorance of the principles by which the world is governed will at length issue in the conclusion that those principles are not at all inherent in matter, but above and beyond it, like the power by which all things were at first created? We have no reason to think that the most thorough knowledge of physical qualities, nay, of all the qualities of the earth and the air, could make us wiser than we now are in regard to ultimate causes, or God's method of governing the world. The most skilful anatomist knows as little of the manner in which the spirit of a man actuates his body, as the unenlightened cultivator of the ground knows of the secret principles of vegetation. The law of gravitation, the existence of which is accounted the greatest philosophical discovery, is itself still a mystery. And though it partly explains the revolutions and relations of the planetary system, it affords us no information

as to God's method of governing the world, and suiting all its dispensations to the moral as well as the physical condition of mankind,—and hence, to those purposes of truth and mercy which, according to the word of God, shall all be certainly accomplished.

One of no ordinary powers of discrimination, has remarked as follows :—"The sciences of nature lie open to our view. Still the mysteries of nature, with regard to the essences of things, and indeed to a multitude of subtle operations, are kept in a kind of sacred reserve, and elude the utmost efforts of philosophy to surprise them in their concealment and bring them to light. The most enlightened men have always been the first to perceive and acknowledge the remaining obscurity which hung around them, just as in the night, the farther a light extends the wider the surrounding sphere of darkness appears. Hence the most profound inquirers into nature have been the most modest and humble. Newton, the greatest philosopher whom the modern world has known, declared, speaking of a distinguished contemporary, from whose genius he augured vast discoveries, but who died in early life, the celebrated Cotes—"If that young man had lived, we should have known something." Those who have devoted themselves to an investigation of the laws of nature find, in a great variety of the most common productions, sufficient to engage their inquiries and employ their faculties ; they perceive that the meanest work of God is inexhaustible,—contains secrets which the

wisdom of man will never be able to penetrate. They are only some of the superficial appearances and sensible properties with which we are familiar—substances and essences we cannot reach. The secret laws which regulate the operations of nature, we cannot unvail. Indeed, we have reason to believe that the most enlarged understanding must, in a short time, resolve its inquiries into the will of God, as the ultimate reason. Thus, one of the best efforts of intellectual cultivation and the acquisition of knowledge is to restore the mind to that state of natural simplicity and surprise, in which every thing above, beneath, and around us appears replete with mystery, and excites those emotions of freshness and astonishment with which the scenes of nature are contemplated during the season of childhood.”—*Robert Hall*.

It does not, indeed, appear that, independently of revelation, progress will ever be made in laying bare the secret springs of the divine government. “The point where the infinite and the finite come in contact has been, and must ever be, hidden from mortal eyes ; the subject is beyond the reach of our understanding.” And when we think for a moment of the distance between God and ourselves—the Almighty who created all things, and feeble man who takes up a pebble or a shell and looks with wonder at it ; or who again remembers “that by his Spirit he hath garnished the heavens, and his hands hath formed the crooked serpent”—we exclaim, like one of old, “Lo, these are parts of his ways ; but how little a

portion is heard of him ; the thunder of his power who can understand ?”

It is of the more consequence to mark the acknowledged ignorance which science has failed to remove, that many, in their opposition to the doctrine of the continued efficacy of the Creator, *make capital of their very ignorance*, and use it boldly to discredit reliance on the providence of God. Thus their *ignorance* serves them instead of *knowledge*. “When,” say they, “the inductive inquirer finds himself involved in some great apparent difficulty, and among phenomena which no existing resources of science are able to explain—which appear to stand forth as irreducible anomalies, and to baffle all attempts at explanation—he is, notwithstanding, to assume “the existence of some physical principle, the cause of the vital functions, *as yet indeed unknown*, but which, nevertheless, at some time *become as well determined* as the principle of respiration or the circulation of the blood.” Well said, Bartimeus! very modestly assumed!—while yet at the wayside begging, and before your sightless eyes are opened!

In opposition to prayer and reliance upon God in a season of calamity, we are, in like manner, sagely taught that “there are mysteries in the creation which beget wonder, self-annihilation, and reverence.” Now, these mysteries have been there from the beginning, and shall be till the end. Is our ignorance of these a reason against prayer? or is it not rather a reason for dependence upon God according to his word? The greater our ignorance, and the deeper

our necessities, the more reason have we to pray to the God of salvation. The secrets of creation being all known to him can be no barrier to the fulfilment of his promise. And if also known to us, how would they animate our confidence in the pleasing hope of obtaining mercy and deliverance according to his word.

Strange, indeed, that philosophers should, in relation to this great subject, take their stand-point in the midst of felt and impenetrable darkness. Away from the light of revelation they seek to grope their way among undiscovered mysteries. The efficacy of the Deity, as taught by Newton, finds no place in their system. To believe that "he is before all things, and that by him all things subsist;" "that he is, and is the rewarder of them that seek him," is, in their estimation, "a foolish and degrading superstition." Nevertheless, those wise men themselves pray, and not only so, but encourage us to join in their undefined aspirations!

SCIENTIFIC PRAYER.

No deeply have the minds of men "in the latter days" been impressed with the notion of a dominant persistent government of law, that even theologians of reputation have been embarrassed in prayer by the difficulty of reconciling the hope of blessing and deliverance from God with the philosophy of the unalterable and unaltered course of nature. Strongly holding by the uniformity of nature and the supremacy of law, some have assigned to prayer a very low place, and speak with pity and contempt of such as look above nature to nature's God. They affirm that prayer for the removal of disease and pestilence "conduces to the fostering of error, and pernicious views of the effect of prayer on the divine arrangements." Now, observe how God is here limited, and the arm of his power held back by his own arrangements. If "binding nature fast in fate," God "has left free the human will" to do what it pleases, he has not, according to this science of materialism, left himself free to do according to his own will. Have the elements, then, ceased to be controlled and adjusted by the will of God? We boast of our knowledge of them, and our power over them. Shall we then deem their action stronger than omnipotence, more unchangeable than God, more enduring

than his throne? Men speak as if God had set the dominion of the elements above himself. They tell us that the answer to our requests is, that the peace of God which passeth all understanding shall keep your heart and mind through Jesus Christ. "The effect of such spreading all our affairs before the divine eye is to be a change in us, not in him." But why should the bestowment of benefits be supposed to imply a change in God? This utterance of a spurious devotion is no new thing. It was that of the wayward Rousseau. "I do not believe," says that philosopher, "that after having provided in every shape for the wants of man in his formation, God interests himself in an extraordinary manner for one person more than for another. But it does not follow hence that prayer is useless. God forbid that I should deprive myself of that resource. Every act of the understanding that raises us to God carries us above ourselves. In imploring his assistance we learn to expect it. It is not his immediate act that operates on us. It is we that improve ourselves by raising our thoughts in prayer to him. All that we ask aright he bestows; and, as you observe, we acquire strength in confessing our weakness. But if we abuse this ordinance, and turn mystics, instead of raising ourselves to God, we are lost in our own wild imaginations. . . . But who are we that we should insist on the Deity's miracles when we please in our favour?" —*Eloisa*. In these devotional aspirations of our philosopher, he does not so much as glance at the scripture ground and benefits of prayer. Any blessing

sent by God in answer to prayer he would account a miracle. He holds the mere asking a precious resource, although quite sure of receiving nothing. We acquire strength not by getting it, but by confessing our weakness, and receive much good by merely asking,—as if a man should replenish his purse by deploring its emptiness, and satisfy his belly not by eating but by asking bread. A man is counted a mystic because he believes in the active care of God, and connects together the two ideas of asking and receiving—the wants of the suppliant who prays, and the munificence of the benefactor who hears and answers prayer. Whose prayers, then, require that truth and common sense should be mystified? The Christian's or the philosopher's? "What man is there of you," said Christ, "whom if his son ask bread, will he give him a stone? or if he ask a fish, will he give him a serpent? If ye then, being evil, know how to give good gifts to your children, how much more shall your Father who is in heaven give good things to them that ask him."

Not a few now, in their zeal for the dominance of law—the superiority of matter to mind—of things without life to all living natures—account it palpably absurd to expect from God the benefits we pray for. They would thus seem to adopt the infidel's prayer, "O God, if there be a God, have mercy on my soul, if I have a soul." Prayer for health and deliverance from pestilence they declare to be an act of the grossest superstition. The laws of nature, they tell us, by which diseases come, are supreme and unalter-

able, so that no prayer for deliverance can arrest their course. Yet, with the Swiss philosopher, they allow prayer to be a great benefit and duty, because by its reflex act the mind is improved and its conceptions elevated. Hence to frequent and even long prayers they do not object, provided you expect no mercy or grace, no blessing or deliverance, in the way of answer. Now, as to the reflex effect of true prayer, we hold it to be manifold and great. It is good to think of God as our Father in heaven, to meditate on the glory of his attributes, to remember his great and mighty works, the benefits already received, and the promises of his unfailing love. But as to the reflex act of sceptical, unavailing prayer, we hold it to be pernicious; and as to him who offers it, "Let not that man think that he shall receive anything of the Lord."—James i. 7. When the processes of the physical creation are exalted above the power of God, prayer is reduced to an unmeaning form. The reflex act of such prayer will inevitably aggravate the mind's natural distrust and dislike of God, and confirm it in the obduracy and the blindness of a feigned homage. What earthly prince would invite petitions which he declared he had no inclination and no power to answer? Would men waste their time in presenting such petitions? or would the fool who should present them be improved and confirmed in his loyalty by the reflex act of his useless supplication? Men will not love God in their hearts who believe that though they cry he will not hear them. And if they indeed imbibe this false view of his character, and imitate

it in their own conduct, will they be improved by their devotion, or seem to others worthy of esteem and confidence? All such devotion is declared in scripture to be unprofitable and vain; and it is even there associated with unbelief, pride, inhumanity, avarice, duplicity, and disobedience to the law of God.

“The inconsistencies of the human mind are indeed unfathomable. We find men, like the late George Combe, . . . avowing their belief that prayer to God has no other value or effect than so far as it may be a good way of preaching to ourselves. It is a useful and helpful exercise for our own spirits, but it is nothing more. Alas, how can they pray who have come to this? Useful and helpful to believe a lie! That which has been threatened as the worst of all spiritual evils, would become the conscious attitude of our ‘religion,’ the habitual condition of our worship. This must be as bad science as it is bad religion. It is in violation of a law, the highest known to man—the law which inseparably connects earnest conviction of the truth in what we do or say, with the very fountains of all intellectual and moral strength. No accession of force can come to us from doing anything in which we disbelieve.”—*Duke of Argyll, in Good Words*, Jan., 1865.

How different is true prayer through faith in the promises of God and the intercession of the great Mediator! Yet, to support the doctrine which denies to us the hope, and to God the prerogative, of giving what we ask according to his word, it has been said, “We are under a purely spiritual dispensation, and

that the laws of the physical economy are fixed and unchangeable." Of these two positions, the latter meets us most frequently ; with respect to the former, it is plainly untrue. We are under a mixed dispensation suited to our complex constitution, which, as a whole, is certainly not "purely spiritual." In a material world we inhabit material bodies, which are subsisted by material aliments. To be fitted for a purely spiritual state of high felicity and honour, our earthly bodies must be changed into the likeness of the glorious body of Christ—strong, spiritual, incorruptible.

We know that physical laws are fixed and unchangeable—God made them so. All the elements of nature, though separately actionless and inefficient, act, or are acted on, by one another, according to the properties inherent in them. In doing so, they are a law unto themselves—there is no higher law to rule them but that of life and mind. This is the paramount law of the universe, and it is necessarily everlasting. We read it in the works of creation, and in the economy of providence; we experience it in ourselves, and we are assured of it by our knowledge of the grace and power of God in the gospel of our salvation.

We believe our fathers spoke soberly when they said : "Prayer moves the hand that moves the world." It is palpably unjust to represent their doctrine of prayer as "popular superstition, which implies a change in God's method of employing natural agencies." If you give bread to a hungry man, or

pull a sheep out of a pit, does that imply a change in your character or conduct? When you turn your hand this way or that, do you then assume a new character? And cannot the all-wise God who made and governs the world, direct its operations so as to bestow his bounty in accordance with the end for which it was created? We never pray against the laws of God, as inscribed either on the pages of the Bible or on the fabric of the world. Who ever prayed that the Nile should cease to flow, or that the Jordan should not overflow its banks? or who now believes that without a miracle the maimed shall be made whole, or the lepers cleansed? An apostle said truly: "We can do nothing against the truth, but for the truth." When we pray for earthly things, we believe the laws of the material creation are not suspended, nor its forces subverted, and that they cannot set aside the hand of God, but obey it. We pray neither against God's method of governing the world, nor against his wisdom in the kingdom of his grace; but consistently with both, as revealed in scripture, for in that sacred record both physical and spiritual efficacy are distinctly ascribed to the volition of God. God gives the Holy Spirit to those that ask him; and he employs living agents, or exerts his own power in heaven and on earth, to fulfil the purpose of his goodness.

Prayer, we ought well to consider, is indeed a most wonderful and merciful institution of God. But we are naturally prone to atheism, and hesitate to believe that the great God will hear us, and freely give us

whatsoever we ask according to his word. It is nevertheless most true that God hears prayer. He who is at the right hand of God, and maketh intercession for us, hath emphatically said : " Verily, verily, whatsoever ye shall ask the Father in my name, he will give you." The prayer of faith, by whomsoever offered, goes up before God as incense. The man who is too mean to approach an earthly prince, and is despised by his neighbour, may come boldly to the mercy-seat of God, and go down to his house justified.

The earthly benefits we ask of God are such as health, food, safety. Even the brute creation are said "to ask their meat from God," and "his full hand supplies their need." And when men believe in God and are born of the Spirit, they rise in their desires from earthly things to heavenly. They ask eternal life, and the blessings which pertain to it; and they receive from God "all spiritual blessings, in heavenly places, in Christ." We ask and receive forgiveness of our sins, the illumination of our minds, peace, hope, strength, purity, and the joyful assurance of a heavenly inheritance "that fadeth not away." "O thou that hearest prayer, unto thee shall all flesh come."

PETER'S PREDICTION OF THE MODERN
SCEPTICAL PHILOSOPHY.

AMONG the marvels of the Bible may be justly reckoned Peter's remarkable prediction of the prevalence, in the latter days, of a philosophy which should repudiate the government of God, and substitute instead a uniform and persistent course of nature, or a government of mere insensate law. Now, the denial of God's interposal in his providence naturally leads to call in question the great economy of mercy and salvation. For both providence and grace, as administered by God, are so related mutually, that a cordial reception of the one begets a firm reliance on the other : both stand or fall together as exhibited in scripture.

Bishop Butler, in his celebrated work, "The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature," remarks :—"Everywhere in this day men take it for granted that Christianity is not true." Since the beginning of the seventeenth century the deistical controversy began to rage in Europe. Descartes and Hume, while admitting God to have created the world, denied his continued operation in upholding it. The latter holds the world to have been so constituted that of itself, and by its own proper operation, it

should accomplish all the ends of providence. Of the former, Pascal says, "He would have wished, in his whole philosophical system, to dispense with God: he could not, however, help giving him a *chiquenaude* (a fillip or permissive sign) to put the world in motion; after that he could find nothing for God to do."

Peter calls the authors of this philosophy "scoffers," and as affirming that "since the fathers fell asleep all things continue as at the beginning of the creation," they show little reverence for the authority of revelation. "Being nominal Christians, they will speak of creation not because they believe it, but as using the common phraseology; or, perhaps, by way of ridicule. For if they allowed the world to have had a beginning, they could not deny the possibility of its having an end."—*Macknight*.

Among people who "spend their time in nothing else, but either to tell, or to hear some new thing," a new system of theology naturally follows in the wake of a new system of semi-scriptural, or semi-sceptical philosophy. We have, accordingly, "a theology that leaves no room for any operation of God outside natural law, permits no special divine, no supernatural intrusion—in one word, no miracle."

Setting aside the Mosaic history of the creation, and the scripture doctrine of the active, universal government of God, authors even of the clerical profession, holding the elements of nature to have been eternal, propound a formation of the world by the alone force of law. "No analogy," says the Rev. Baden Powell, "points to the beginning of physical

causes. Physical philosophy always supposes at least some physical elements in existence—it cannot investigate or conceive a condition antecedent to, or the cause of its actual commencement.” So, then, this philosophic theologian cannot conceive of the Almighty being, as the Bible tells us “before all things, and that by him all things consist.” Of what we call creation, he gives the following account, understand it who can:—“In that mass of (vaporised or nebulous) physical agents, or the elements of them, thermatic, electric, chemical, molecular, gravitational, luminiferous, and, by consequence not less, all organic and vital forces, must have been included. Out of it in some way, by equally regular laws, in the one case as in the other, must have been evolved all forms of inorganic and equally of organic existence—whether amorphous masses, crystals, cells, monads, plants, zoophytes, animals or man—the spiritual man belonging to another order of things—a spiritual creation.”

The origin and existence of the world being thus assigned to nature and to law, the course of things in creation is supposed sufficiently secured by the same unfailing power of nature and of law. “A real break,” says Mr Powell, “in the connexion and continuity of physical causes cannot exist. If such breaks often appear, they are due solely to our ignorance. There is no period, however remote, at which we can legitimately imagine the chain of physical causation broken to give place to disconnected influences of a wholly different kind.” Now “these dis-

connected influences of a wholly different kind," clearly signify the interposal of God—and not less the services of his living messengers—both of which are inadmissible in the alleged universal empire of physical insensate law.

How much is here assumed. What superhuman mental grasp is vainly arrogated in this most fanciful and crude hypothesis. The utter disregard of truth and evidence in this ridiculously arrogant pretence of showing how creation must have been effected, is positively lamentable. The ghostly successor of Peter only governs worlds of which, as he affirms, he has received the keys from heaven. But our apostolic theologian takes higher grounds, and boldly sets about the work of creating all things—physical and intellectual—or at least of showing how this must have been accomplished "by regular laws." No marvel that others, like the author of the *Vestiges*, should deny that God created the world. This same philosophy will, in its spirit and tendency, not improbably survive all other forms of error and imposture. "When the thousand years are expired," the remnant, *loipoi*, of the army of the beast and of the false prophet (Rev. xix. 24, and xx. 5), together with the successors of the sixth part of Gog that was left at the beginning of the thousand years (Ezek. xxxix. 2) will constitute the great host, "as the sand of the sea," of Gog and Magog that will then go up against "the camp of the saints and the beloved city." This impious multitude, deceived by the evil one, may justly be supposed to call in question the coming of the

Lord, and blindly to affirm a regular and constant course of nature and events. Nay, with the unbelieving and the disobedient, so shall it be at the end of the world.

Less, however, than a dominant eternal chain of physical causation at the present time, suffices the more sober claims of a less anti-scriptural hypothesis. The abettors of this modified scheme are content to hold by a system of arrangement supposed to have been made by the Creator when he settled the constitution of the world, and set all its parts in order. Laws then impressed upon the globe came into operation, by which, it is affirmed, the universe continues to be governed. This is, in fact, the theory by which Descartes and Hume ignored the providence of God and every idea of divine interposal. It is now, however, generally held as fundamentally established, and as, indeed, accordant with the doctrine of scripture. Even evangelical divines are among its strenuous abettors ; among whom the very able author of "The Method of the Divine Government" must be regarded as holding a distinguished place.

"Science as it advances," remarks Dr M'Cosh, "has been widening the dominion of law, and has detected its presence where the unlearned saw only caprice, and where the piously disposed mind was accustomed to contemplate the divine power acting independently of all instrumental causes.* It is now

* The great and too prevailing error of even piously disposed minds is to look too much to instrumental causes, and to forget the mighty God, "of whom, and through whom, and to whom, are all things."

acknowledged that there are physical laws determining every fitful breeze, and every forming cloud, and every falling shower." And what, we ask, determines those laws or causes? With whom, or where do they originate? Who holds the winds in his hand, and directs the forces by which the sunshine and the rain, the thunder and the tempest, go forth from the one end of heaven even unto the other? The hypothesis which would subject those diverse and ever-varying phenomena to the rule of fixed, undeviating, and insensate law is, we fear not to say, fallacious, and flagrantly opposed, not only to the clear statements of divine revelation, but also to the true principles of science, and certainly not less to the general convictions of mankind.

In regard to providence, the doctor conceives the world to have been so constituted as to furnish answers to the prayers of mankind. Wherefore it must needs follow, that our globe and its laws—all material, of course, and lifeless—through the sequences of nature, not only accomplish all the ordinary ends of providence, but fulfil the purposes of God in the kingdom of his grace. And as Mr Baden Powell comprises living natures in his scheme of creation by the power of law, so Dr M'Cosh must, in some sort, include spiritual and heavenly blessings as well as temporal benefits in the constitution of the world. According to this theory, the answers of all prayers which shall ascend to God in the time to come, including things both temporal and spiritual, are now on their onward way in the sequences of nature to be

realised in the coming glory of the kingdom of the just. The chief burden, however, of all true prayer is spiritual and not earthly blessing. It is not food and clothing, or things which we receive in common with the beasts that perish, but knowledge, understanding, peace, hope, courage, joy, strength, we are instructed to solicit in our prayers to God. The prayers recorded in scripture, and the style of prayer taught there, are such as it suits sinful men to present to the God of salvation through the intercession of their Lord and Saviour. Our necessities as sinful and immortal beings are by a great deal more numerous and urgent than our wants as dwellers on the earth. And since it can be no disturbance of the mind of God and the operation of his Spirit to give us grace and blessing in our time of need, according to his promise, it cannot justly be supposed a disturbance of the system of the physical creation that he should give us all needful promised earthly blessings.

"God," says the doctor, "does not require to interfere with his own arrangements in order to answer prayer, for there is an answer provided in the arrangements which he has made from all eternity. When the question is asked, How does God answer prayer? we give the very same reply. It is by the preordained appointments when he settled the constitution of the world, and set all its parts in order." —p. 230.

Now, as to the common view of prayer, it is not supposed that God requires to interfere with his own arrangements when he gives us what we ask, according

to his word ; nor is it at all conceived that physical arrangements comprise the mercy and salvation for which we daily pray in the name of Jesus. And on our reception of these greatest and enduring benefits, our earthly state and comfort are essentially dependent. "Delight thyself in the Lord, and he shall give thee the desires of thine heart." "Seek ye first the kingdom of God and his righteousness, and all these things shall be added unto you." On our author's theory of prayer one of his reviewers thus remarks : "In regard to the method of answering prayer in consistency with the uniformity of nature, Mr M'Cosh expresses his decided preference for that which supposes that, in the prospective arrangements of his providence, God had an eye to the prayers which should be offered by his people, and in these arrangements provided for their being answered."—*North British Review*, p. 524.

How inconceivable, and manifestly contrary to the word of God, that the answer of prayer should be interwoven with the frame of the world, and result from the sequences of nature ! The doctor, however, holds that God is ever intimately present in all his works, and nothing can take place but as he pleases. And who doubts the omniscience and omnipresence of God ? Yet who can conceive in what sense or to what purpose he is present, in regard to operations with which he has not interfered since the world began, "excepting the miracles employed to attest divine revelation ?"

On the subject of prayer, assuredly the voice of inspiration is our only safe guide. "Do not err, my

beloved brethren ; every good gift and every perfect gift is from above, and cometh down from the Father of light, with whom is no variableness, neither shadow of turning." To look to God when we ask, and to physical sequences for the answer, would seem a strange procedure. Do you not expect an answer by the same kind hand that was stretched out to receive your petition ? It was so of old. "My voice wilt thou hear in the morning, O Lord ; in the morning I will direct my prayer unto thee, and I will look up." He who thus asks does not look up to heaven when he prays, and downwards to the earth for the wished for answer. How gratuitous and baseless the theory that would teach us to look in both directions : for by no process of induction can it be established on a scientific basis ; and as to scripture, it is not pretended to be there inculcated.

Seeing nothing is exempted by the authors of this philosophy from the supremacy of law, "some have been pained and perplexed while endeavouring to reconcile prayer with God's orderly government of the universe by fixed, unchangeable laws, and while seeking to comprehend what has been called the philosophy of prayer, prayer itself has been neglected, or has been allowed to degenerate into an empty form of words." —*Good Words*, July, 1862.

In regard to difficulties of this kind, as they existed (and still exist) in the heathen mind, Seneca remarks : "We are assured that vows are profitable (the force and power of fate always reserved), for some things are left in suspense by the gods that they turn into

good, if vows and prayers are made to them. This, therefore, is not repugnant to destiny, but included in the same. Thou wilt say to me, this shall happen, or shall not happen. It must come to pass, if you vow and make request. If it shall not come to pass, vow and pray as you list, it shall not fall out. To vow or not to vow is comprehended within destiny." How evident is it hence "that the world by wisdom knew not God." To the fates and destiny of Seneca, our philosophy finds an equivalent in the laws and sequences of nature. And as Seneca places vows, and prayers, and their benefits, in destiny; so now the answer of prayer (and why not prayer itself?) is comprised in physical sequences.

With the wisdom of Seneca the system of Confucius, as held by the Chinese, seems strikingly accordant, as both evidently are with our modern philosophic theory of paramount persistent laws. "The religion of Confucius, which is more a system of philosophy than a religion, may be considered the orthodox or state religion of China, since both the emperor and the educated classes belong to it. Neither he nor his followers appear to believe in a personal God; but they believe in presiding powers of nature—in fact, as the arbiter of events, and in a principle of order which is termed 'the soul of the world.' The maxim of Confucius is the key to the religious spirit of his followers: 'Respect the gods (that is, pay them due honour); *but have as little to do with them as possible.*'"—*Missionary Record*.

Such being the unhappy fruit of believing that "all

things continue as they were from the beginning of the creation," it was not without a reason worthy of "the Father of lights" that Peter was inspired to foretell the prevalence in the latter days of a philosophy which should boldly repudiate the government of God, as clearly and emphatically taught in the sacred oracles, wherein, without any doubt, the secret and philosophy of all true prayer lies. "And this is the confidence that we have in him, that if we ask anything according to his will, he heareth us: and if we know that he hear us, whatsoever we ask, we know that we have the petitions that we desired of him."—1 John v. 14, 15.

Now, the philosophy foretold by Peter did not anciently prevail among either Jews or Gentiles, although the proneness of the hearts of men to atheism was then everywhere manifest. Among the Jews, some, in opposition to the law and the prophets, obdurately said: "The Lord shall not see, neither shall the God of Jacob regard it;" and again, "The Lord will not do good, neither will he do evil." And among the Gentiles also, some, not liking the common notions of a providence, adopted a less irksome and more convenient hypothesis. The followers of Epicurus, who taught philosophy at Athens, held that the universe was eternal, and the soul a natural substance; they denied that God concerned himself with the government of the world, or interfered in the affairs of men. Lucretius, a Latin poet of this school, controverted the existence of a creator, a providence, and an immortal state. These exceptions, however,

could not displace the deeply seated convictions of mankind, or efface their abiding sense of dependence and responsibility. How plainly is this shown by the reasoning of the inhabitants of Melita. When they saw the viper fasten on Paul's hand, they said among themselves, "No doubt this man is a murderer, whom, though he hath escaped the sea, yet vengeance suffereth not to live."—Acts xxviii. 4.

On this ground Paul at Athens argues against the absurd adoration of images. "God, who made the world, and all things therein, seeing that he is Lord both of heaven and earth, dwelleth not in temples made with hands; neither is worshipped with men's hands, as though he needed any thing, seeing he giveth to all life, and breath, and all things: for in (by) him we live, and move, and have our being; as certain also of your own poets have said, For we are his offspring. Forasmuch then as we are the offspring of God, we ought not to think the Godhead is like unto gold, silver, or stone, graven by art and man's device." So far, then, notwithstanding the atheism taught by Epicurus, the Athenians and the apostle occupied common ground.

The poet quoted by Paul was Aratus, a countryman of his own, and born in Cilicia about 300 years before Christ. His poem, which he wrote in Greek, was translated into Latin by Cicero, who says that the verses of Aratus are noble. It appears to have been in high estimation among the ancients. The introductory part of this poem has been thus translated:—

"From God begin the song. Him all mankind
Should celebrate in never-ceasing praise :
'Tis God attends us in our common walks,
And public councils. Intimate he fills
Th' expanded sea, and all its busy ports,
With his all-powerful presence. On his hand
We always hang ; his blessings we enjoy,
For we are ev'n his offspring. He in love
Paternal points us to the good of life,
And, careful that his children should not want,
Enkindles them to labour ; he instructs
The proper time to break the stubborn earth
With the sharp plough, or turn it with the spade.
He too directs the seasons, when to dig
The trench for plants, and when to cast the seed
Into the genial bosom of the ground ;
For he, in heaven, has fixed the unerring signs,
And wisely marshalling the host of stars,
Has given those radiant orbs to guide the year,
And teach mankind the hours for every toil.
Hail, thou Almighty ! whose propitious smile
We first and last invoke : Hail, sire of all !
Thou, the great wonder, and great friend of man."

Theological Repository, vol. 1.

It is truly sad to think that the philosophers of heathendom, while absurdly embracing a degrading system of idolatry, nevertheless, thought more rationally and spoke more like the truth of God than some of our philosophers do now. The Stagirite, treating of the doctrine of being, "speaks of a first cause, a mover, which he conceives to be simple intelligence, or God, that by the exertion of its energy originates motion, and is perpetually and necessarily occupied in so doing." "Socrates, like others, speaks of the one God, who formed the universe, in which are all

things beautiful and good, and who holds it together." In general they ascribed to living agents phenomena which could not possibly result from lifeless, inert substances. And while they had "gods many and lords many," they still retained the idea of one supreme Deity, a notion now distinctly held in India.

The conviction of the paramount supremacy of living power is a fundamental principle of belief among mankind. They saw, and still see, in providence what only living power could effect—the ever-watchful, variable operation of wisdom and beneficence. And the man who does not see the hand of God in providence cannot well behold it in creation; for if the things made of old display the divinity and power of the Creator, the things done continually equally demonstrate his ever-watchful care. Hence the inspired declaration to a Gentile auditory, that God who made all things "has not left himself without witness, in that he did good, and gave us rain from heaven, and fruitful seasons, filling our hearts with food and gladness."

The prediction of Peter would be fulfilled among a people acknowledging the truth of sacred writ, in which the great events of the creation and the deluge are recorded. Could any conceivable events more entirely demonstrate the interpositional and the power of the great Creator? Paley, in his *Natural Theology*, well remarks: "The *wisdom* of the Deity, as testified in the works of creation, surpasses all idea we have of wisdom, drawn from the highest intellectual operations of the highest class of intelligent beings with

whom we are acquainted. . . . The degree of knowledge and power requisite for the formation of created nature cannot, with respect to us, be distinguished from infinite."

The scripture account of the creation does not, we think, inform us when the mass of the earth was first produced, but merely describes its formation as it now appears. The phrase "In the beginning," may, as in John i. 1, refer to a time anterior to the Mosaic era. Does not Moses begin his narrative by presenting the globe as existing in the state of chaos? "The earth was without form and void, and darkness was upon the face of the deep. And the Spirit of the Lord moved upon the face of the waters." It was unorganized and empty until divided into seas and dry land, and furnished with herbage, trees, and tribes of living creatures. But at whatever time the globe at first existed, its formation by the power of God for the residence of man and all existing tribes of being, confutes the scoffers who deny all divine interposition, or any change in the natural condition of the earth. The fact of creation powerfully demonstrates divine interposal, and this fact is not affected by the question of time.

"Eternity, with all its years,
Stands open to thy view ;
To thee there's nothing old appears,
Great God, there's nothing new.

The deluge, (whereby the world that then was, being overflowed with water, perished,) happened 1640 years after the creation. This extraordinary

visitation also affords a standing confutation of the "scoffers." When "all flesh corrupted their way, and the earth was full of violence," God awfully interposed to give a new and punitive direction to the elements. Nor has their milder and more ordinary evolutions since the deluge ceased to show that all things do not continue as they were from the beginning of the world. To bring on the deluge, "the windows of heaven were opened, and the fountains of the great deep broken up," so that the whole earth was submerged during three hundred and sixty days. Thus the same element of water from which the earth arose, and by which it afterwards subsisted, was by the hand of God—not by fixed law—made the means of its destruction. Water, we know, has no power of its own either to continue as it was, or to change its condition and engage in new enterprises. It is passive in the hand of God, as also in the hand of man; like fire, or any other element, it requires to be applied. No element is made to rule itself, far less to rule the world, and least of all to supersede the power of omnipotence.

Of this great catastrophe, of which the traces are manifold and deep, distinct mention is made in the records of all nations. And men of the greatest knowledge and research admit the evidence of it to be manifold and undeniable; albeit some difference of opinion is allowed to exist as to its actual extent. To the progress of the infidel philosophy it must remain a formidable barrier, unmovable as the Andes or the Alps. Nevertheless, Hume scouts the notion

of a deluge as utterly absurd and unworthy of belief. But this neither alters its character nor lessens its importance as a most extraordinary visitation of God. Accordingly, by this great event, together with the creation of the world, the apostle shows that all things do not continue as they were, and are not, as affirmed by our sceptical philosophers, under the dominion of invariable laws. This gratuitous philosophy wilfully overlooks the unquestionable facts of authentic history—facts of which all nations retain the record and the evidence. Where has not the deluge left marks of its violence, or what nation has not furnished some positive testimony of its prevalence and power?

Both the globe and the condition of mankind have doubtless undergone a mighty revolution, and all things are far from continuing as at the first. "Sin entered into the world, and death by sin." Moral evil did not belong to man's first estate, and physical evil could not then have place. The external world, as at first created, was all beautiful and fair, and pronounced by God himself "good,"—nay, "very good,"—a term which in scripture signifies rich, genial, salubrious. But now, as the wise man saith, "all things are full of labour," and, "the misery of man is great upon him." The world, as it came beautiful and good out of the Creator's hand, did not present those marks of his displeasure which are now stamped upon it. And is it not preposterous that professing Christians should have the boldness to affirm that no change has taken place, or can take place, apart from the dominion of a chimera which

they call *law*? Of this chimera how truly is it said: "It is a perversion of language to assign any law as the efficient, operative cause of anything. A law presupposes an agent, for it is only the mode according to which an agent proceeds: it implies a power, for it is the order according to which that power acts. Without this agent, without this power—which are both distinct from itself—the 'law' does nothing—is nothing."

Wilfully to ignore the greatest of physical events is not what true philosophy would teach. To what erroneous conclusions does such conduct lead! A system of unmingled earthly goodness (and such was the first creation) could not be the antecedent of a deeply felt and continuous succession of evil consequents. The peculiar sorrows of the woman resulted from transgression, not surely from the laws of her first estate. It was in just severity God cursed the ground for man's sake. How great then the change made upon the earth in consequence of sin! Though recently altogether lovely, genial, and fruitful, it henceforth becomes the sad abode of labour, weariness, and sorrow. New conditions of the ground and of the air must have resulted from the curse, and still further from the deluge. To what but to this overwhelming visitation are we to attribute immense desert wastes, some of them of greater extent than many a kingdom. Doubtless, suffocating deadly winds, pestilential marshes, sickly malaria, were not in the world when God pronounced it "very good."

Of these adverse agencies, involving the salubrity

and temperature of the world, the abbreviation of human life from 950 years (which was the life of Noah) to threescore and ten, or fourscore years, was a natural consequence. Both solar and atmospheric changes must have corresponded in their effects on both sustenance and life. "It is probable," says Calmet, "that the first men were of a strength and stature superior to those of mankind at present, since they lived a much longer time; long life being commonly the effect of a stronger constitution." By the infliction of the curse, together with the desolations of the flood, some at least of the primordial conditions of the earth were not merely modified, but materially altered. Pain succeeded pleasure; health gave way to sickness; and life was swallowed up by death. The condition of the world and of mankind being thus essentially changed, there must have been, of necessity, a change also of its laws. In reference to this memorable fact, the Apostle of the Gentiles says:—"The creature (the creation) was made subject to vanity, not willingly (not in accordance with its primordial condition), but by him who subjected it."—Rom. viii. If the abundant growth of thorns and briars resulted from the curse, and pertained not to things accounted "good," doubtless volcanoes, earthquakes, hurricanes, tornados, whirlwinds, the simoom, and the sirocco, together with malaria and pestilence, were not among the laws impressed upon the world prior to the entrance of sin. In describing the awfully sweeping judgments which shall destroy the great system of iniquity which has been reared

against the kingdom of the Son of God by the false prophet, the woman and the beast, Isaiah refers, in illustration, to the terrible effects of the Noachic deluge, chap. xxiv.

But for "man's disobedience" he might have lived for ever in the atmosphere of Eden, and be there privileged to eat of the tree of life. The constitution of the world has been always in accordance with the moral state of its inhabitants. Albeit there is, of necessity, a permanent established order. The regular phenomena and course of nature relate to man's existence, not to his character and conduct; irregular and special phenomena are adapted to his moral state. Irrespectively of war, inundations, earthquakes, the sun rises and sets, and the seasons revolve. Hence, while some things continue as they were, there are evidently others which, like the weather and the clouds, are continually changing. Diverse and great vicissitudes in nature and providence are undeniably frequent. The only doubt respects their cause, which our material philosophers imagine they can see in things without life. They "refer every thing to a *principle of order* in nature." "A principle of order," says Paley, "is the word; but what is meant by a principle of order, as different from an intelligent Creator, has not been explained, either by definition or example, and without such explanation it should seem to be a mere substitution of words for reasons, names for causès. Order itself is only the adaptation of means to an end; a principle of order, therefore, can only signify the mind and

intention which so adopts them. Where order is wanted, there we find it ; where order is not wanted, *i.e.*, where, if it prevailed, it would be useless, there we do not find it." The machine of the world, however, requires to be sustained and regulated by the hand that made it. Subordinately living agents labour in ten thousand ways as instruments of providence. The world was made for their use. They construct habitations : their chief concern is to get food, and what God gives they gather. They create nothing ; for they are themselves a part of creation as constituted and sustained by God. Nevertheless, by the exercise of their varied and admirable faculties they not only "modify things," but originate permanent and important sequences. And when "all the ends of the world shall remember and turn unto the Lord," mankind will "subdue" all things, "and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth."

In comparing the ancient polytheism and the dogmas of our new philosophy, various striking coincidences are observable. As the former admitted that the gods, who were in fact deified men, all sprung from chaos, so the latter assumes that the origin and life of the human race, and indeed of all living natures, have arisen from the mass of unorganised and lifeless substances. They stop not to decide whether the bird or the egg, the seed or the tree, was first, or how the former, whatever it might be, came into existence. Now, can anything display less of reason

and of truth than to turn away from the magnitude, diversity and splendour of creation, and its divinely constituted agencies, to look after the chimera of a fancied abstract law, like the necromancers, "that peeped and that muttered"—"the living to the dead." God has shown us his greatness, his majesty, his power, and his goodness, by spreading out the heavens in their glory, and giving us the earth to dwell in.

And we ourselves, who are his workmanship, are "fearfully and wonderfully made." How great and wonderful then is God, by whom all things were created, and by whom they all subsist! Meantime, it is our happiness to be assured that "they who shall be accounted worthy" to obtain the better world to come, shall know even as they are known. Being equal to the angels, and having true apprehensions of the greatness and the glory of the infinite and blessed God, they "worship him that liveth for ever and ever, and cast their crowns before the throne, saying, Thou art worthy, O Lord, to receive glory and honour and power : for thou hast created all things, and for thy pleasure they are and were created."

GLASGOW :

PRINTED BY DUNN AND WRIGHT,
WEST NILE STREET.



